December
NSC

MODERN MECHANIX
HOBBIES AND INVENTIONS

NOW 15¢

Engineering Features of 1937 Auto Marvels

TRAPPING ENEMY SPIES by THOMAS M. JOHNSON

DEC. 1936
MODERN MECHANIX HOBBIES AND INVENTIONS
15 CENTS

SAVE UP TO 50% at Factory Prices!

You'll Be Excited over MIDWEST'S DIAL-A-MATIC Tuning and Exclusive ELECTRIK SAVER!

Your radio enjoyment is doubled with Dial-A-Matic Tuning, the amazing new Midwest feature that makes this radio practically tune itself. Now, even a child can bring in ten perfectly tuned programs in ten seconds! It's a big thrill to whirl the dial . . . and then hear the station you want . . . come in instantly, automatically, perfectly. Zip-zip-zip . . . the programs roll in perfectly tuned . . . as fast as you can press buttons! This new Midwest feature will perform new miracles of radio for you.

New 1937 AIR-TESTED 5-BAND

16-Tube MIDWEST Radio

9 to 2200 METERS

Only $49.95 COMPLETE WITH GIANT THEATRE SONIC SPEAKER (LESS TUBES)

TERMS AS LOW AS $5.00 DOWN

30 Days FREE Trial!

Send for big FREE 40-page 1937 Midwest catalog — before you buy any radio — and see for yourself why scores of thousands of radio purchasers have saved up to 50% by ordering the Midwest factory-to-you way since 1920. Learn why Midwest radios are preferred by famous movie stars, orchestra leaders, musicians, sound technicians, and discriminating radio purchasers everywhere.

Once again, Midwest demonstrates its leadership by offering this amazingly beautiful, bigger, better, more powerful, 16-tube, 5-band world-wide radio — a startling achievement that makes the whole world your radio playground. Out-performs $150 radios on point-for-point comparison. Powerful Triple-Twin Tubes (two tubes in one) give 20-tube results.

BECOME YOUR OWN RADIO DEALER

Save the jobber's-retailer's profits that often amount to 50% of ordinary retail prices. Become your own radio dealer and buy at wholesale prices direct from the Midwest factory. Never before so much radio for so little money! Why pay more?

This super deluxe Midwest radio is so amazingly selective, so delicately sensitive, that it brings in distant foreign stations with full loud speaker volume on channels adjacent to powerful locals. You'll thrill over its marvelous super-performance . . . glorious crystal-clear "concert realism" . . . and magnificent world-wide foreign reception. Scores of marvelous Midwest features, many of them exclusive, make it easy to parade the nations of the world before you. You can switch instantly from American programs . . . to Canadian, police, amateur, commercial, airplane and ship broadcasts . . . to the finest, most fascinating world-wide foreign programs.

Before you buy any radio, send for our big FREE 40-page 1937 catalog—and take advantage of Midwest's sensational factory-to-you values. You have a year to pay and terms are as low as 10c per day — and you secure the privilege of 30 days' FREE trial in your own home. In addition you are triply protected with Foreign Reception Guarantee, Full-Year Warranty and Money-Back Guarantee.

ELECTRIK-SAVER

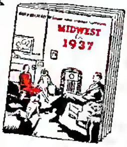
This exclusive Midwest feature cuts radio wattage consumption 50% . . . results in Midwest radios using no more current than ordinary 7-tube sets . . . enables them to operate on voltages as low as 80 volts.

Only MIDWEST Gives You

16 TUBES • 5 WAVE BANDS
9 TO 2200 METERS • ELECTRIK SAVER
• DIAL-A-MATIC TUNING •
• AUTOMATIC AERIAL ADAPTION •
DUAL AUDIO
PROGRAM EXPANDER

MY MIDWEST NOT ONLY MEETS BUT SURPASSES MY MOST CRITICAL STANDARDS.
Bing Crosby

NO SET THAT I HAVE EVER OWNED HAS BROUGHT IN FOREIGN RECEPTION SO CONSISTENTLY AND SATISFACTORILY.
Gloria Stuart



MIDWEST RADIO CORP.

DEPT. F-10
Established 1920
QUALITY RADIOS SINCE 1920
CINCINNATI, OHIO, U.S.A.
Cable Address MIRACO... All Codes

MAIL COUPON TODAY *for*
Free 30-DAY TRIAL OFFER
and 40-PAGE FOUR-COLOR *Free* CATALOG

QUALITY RADIOS SINCE 1920

MIDWEST RADIO CORPORATION
Dept. F-10, Cincinnati, Ohio

Without obligation on my part, send me your new FREE catalog and complete details of your liberal 30-day FREE trial offer. This is NOT an order.

Special offer and prices prevail only when dealing direct with factory by mail.

Name...

Address...

Town.............................. State..................

●

YOU CAN REPEAT ALMOST EVERY EXPERIENCE IN LIFE

—EXCEPT

life-itself

★

TODAY is life. Tomorrow is a hope. Yesterday is a dream. Nothing is so dead as a day that has passed. Only the trailing clouds of memory remain.

One *today* upon another *today*—how quickly a decade is built! Youth approaches manhood in high heart, embraces maturity as the period of his conquest, then "remembers with a sigh the days that are no more."

So life goes—like that. NOW is the only opportunity. NOW is the moment of success. NOW men decide—NOW men win or fail.

Are you one of the men who are wondering today what will happen to them tomorrow? Then remember this: *If you take care of today, tomorrow will take care of itself.* And one of the most important safeguards you can take is to be certain your *training* is modern . . . that you are adequately equipped to master the problems of 1937. Today, in almost every line of human endeavor, ambitious men are modernizing their training by spare-time study of International Correspondence Schools Courses. Their action is a guide to you — and NOW is the time to act! Complete information on any subject in which you are interested will be sent without cost or obligation. The coupon is for your convenience. Return it today.

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BOX 2317-K, SCRANTON, PENNA.

★ Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject *before* which I have marked X: ★

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☐ Boilermaker
☐ Telegraph Engineer
☐ Telephone Work ☐ Radio
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Name..*Age*..................*Address*..

City..*State*..........................*Present Position*..

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

PRICE
15 CENTS

SAME PRICE
IN CANADA

MODERN MECHANIX
HOBBIES & INVENTIONS

DECEMBER
1936

Volume XVII
Number 2

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NEXT MONTH

Here is Walter Disney with his world famous character "Mickey Mouse" who recently celebrated his eighth birthday. Just how the funny little fellow is made to perform his amazing antics on the screen will be related in the January issue by his creator whose own illustrations will show just how squeaks, squawks and oinks are set to music. Don't miss this unusually interesting feature. It's just one of the many appearing in the January, 1937, issue on sale December 1. Look for Disney's "Silly Symphony" on the cover.

FOR WORKSHOP FANS

Among the many interesting projects included in the January issue there will be plans for building a Toboggan Slide, Spinning Metal Dishes on a Lathe, Metal Tube Portable Amplifier, Christmas Home Decorating and many other workshop plans, suggestions and time saving kinks.

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TODAY...

Almost Broke!

Yet tomorrow Tom Smith will be on his way toward being a really successful man . . .

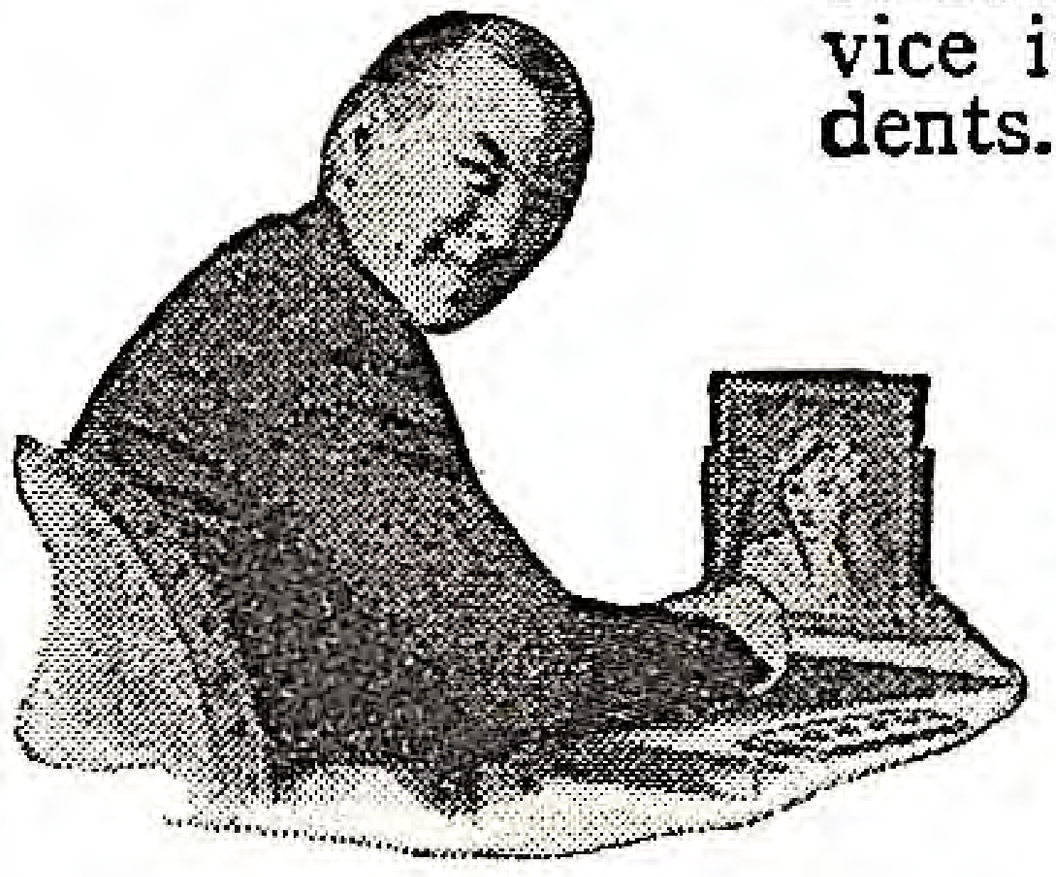
SOMEWHERE there is a Tom Smith—that name is as good as any—who is practically flat broke, back on his heels and discouraged today. Perhaps he's in debt. Perhaps, as far as his job is concerned, he's in a rut. Perhaps he's just a victim of these trying times. Yet—he still has vision, imagination. And—ambition. He still believes that he's going *somewhere* . . . somehow, some way, some time. He hasn't given up hope. He still believes in success and opportunity.

Tom Smith will read this advertisement. No—there is a better way of saying it. Tom Smith *will study* this advertisement. He will read it once, then again, then yet again. It will strike a responsive chord somewhere within him. It will stir his dormant ambition, give wings to his imagination, set his vision afire. And he will *act!* As though Hope—as swift and powerful as lightning when it strikes—had suddenly taken possession of him, he will take advantage of the opportunity this advertisement offers him. And then—

Six months from now, his friends will say, "Have you heard about Tom Smith? Yes—just got a new job with an increase in salary." And two years later, the business journals in his field may report, "Thomas Smith Appointed Manager." And five years . . . or ten . . . or fifteen years hence, the sign on his office door may read "Thomas Smith, President."

All because Tom Smith had the vision, the imagination, the ambition, to recognize the significance of this advertisement. Because he had the foresight to see that here was his way to opportunity.

* * *



This page advertises the training of LaSalle Extension University. It is a unique university in many respects. It utilizes Uncle Sam's postal service in its contacts with its students. It is the university for those men and women who work by day in every type of business and profession. It is the university of the clerk ambitious for success in accountancy. It is the university of the business man with an eye upon an executive position. It is the university of men and women, young and middle aged, who wish to become accountants, bankers, sales managers, traffic experts or specialists in some one of twenty different fields. In short, it is the university for ambitious people, determined to succeed, who recognize that only by thorough specialized training can they reach their objectives.

In the history of LaSalle Extension University, there have been more than 850,000 such men and women. They have gladly substituted night hours of study for night hours of aimless pleasure. They have sacrificed hours of minor enjoyment to reach years of major success. They have studied hard—accumulated the accurate, comprehensive and practical training LaSalle offers by its famous Problem Method—thus wresting from Life the success which long before many had thought was not for them.

The LaSalle Method is comprehensive, yes. It is accurate, up-to-the-minute and alive. It is invaluable training. But above all things, it is a Road Toward Success. It is not an easy road. It is not the road for sluggards, for those who refuse to sacrifice and work. Rather, it leads to their destination only those who have the will to *finish* what they have once *begun.*

* * *

Perhaps you think that prophecy of Tom Smith's career mentioned above is pure fantasy. Perhaps you feel it is solely the product of an advertising writer's imagination. If such are your beliefs, you are wrong. For that prophecy is based upon past experience—

The past experience of thousands of discouraged Tom Smiths who read just such an advertisement as this years ago. Tom Smiths with vision and ambition and imagination who accepted LaSalle's offer of one of the booklets listed below. And—who found the booklet so intriguing, so full of hope, that they enrolled in LaSalle . . . and as the months passed, they found themselves rising out of their rut, reaching toward more attractive and better-paying jobs. Finally, achieving rich and deserved success in their chosen lines.

Tom Smith, wherever you are, whoever you are, whatever are your ambitions—here is your opportunity! Are *you* going to pass it by?

LA SALLE EXTENSION UNIVERSITY, Dept. 12493-R, Chicago

I am in earnest about my success and I would like to have your special booklet—without any cost or obligation to me—about my opportunities and your success training in the business field I have checked.

- ☐ **Business Management**
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- ☐ **Personnel Management**
- ☐ **Business Correspondence**
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- ☐ **Office Management**
- ☐ **Stenotypy**

*Name*______________________________*Age*__________

*Position*__________________*Address*____________________

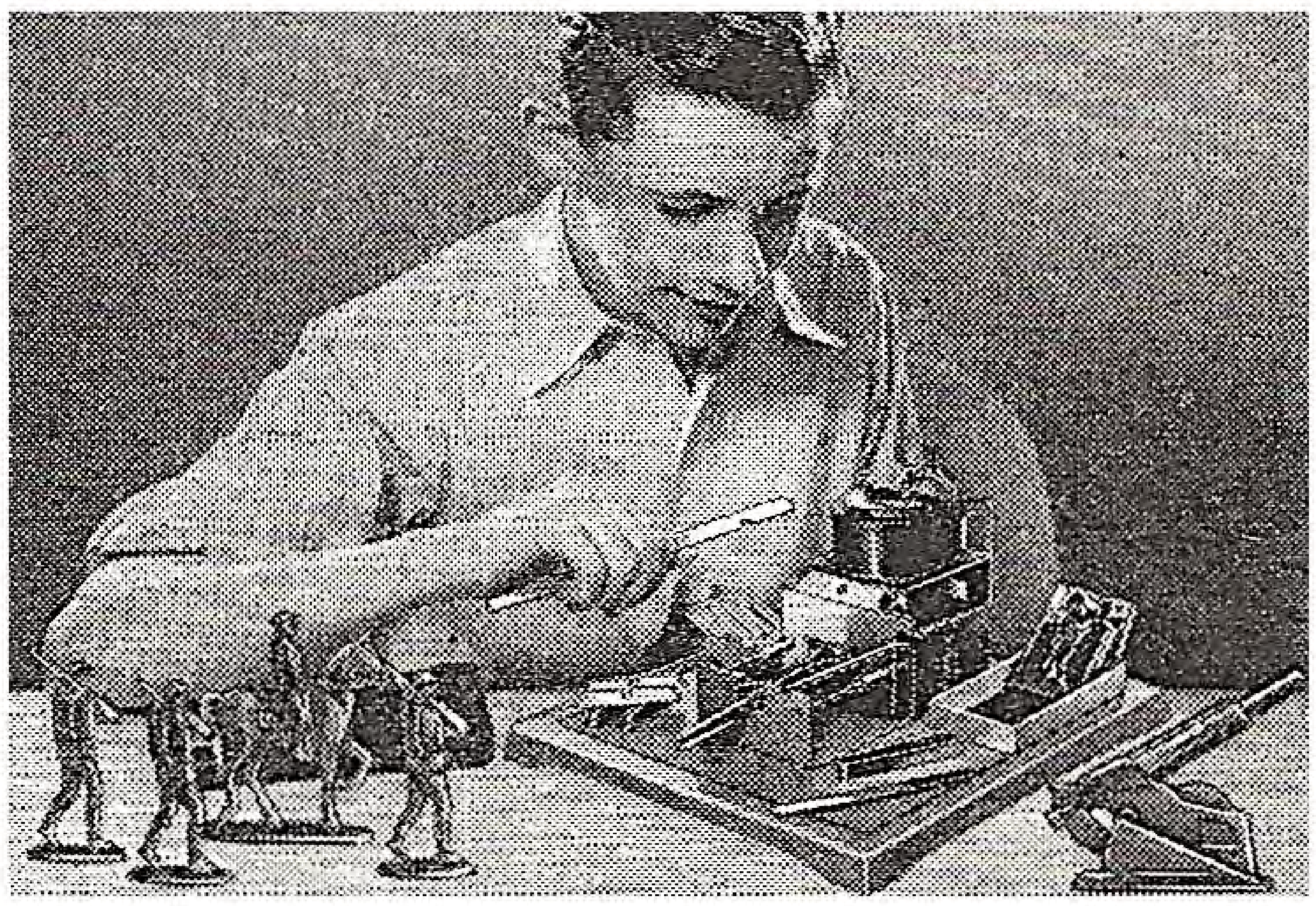
LaSalle Extension University

Ask for one of these booklets—or a similar one on your own field of business. They are free!

PERSONNEL MANAGEMENT
Accountancy
Leadership
MODERN EXECUTIVE

BOYS! MAKE LEAD SOLDIERS BY THE DOZEN

Mould Your Own Army — Band — Athletic Teams



With the new Gilbert Electric Kaster Kit, you can easily make a whole regiment of lead soldiers. Color them, too, with Kaster Kit paints, so they look just like the finest soldiers you can buy. Extra Kaster Kit moulds make football and baseball players, a military band, cannons, animals and other exciting models. Earn extra money by selling Kaster Kit models to your friends.

Kaster Kit operates by electricity. Safe and easy. See it at your nearest toy store. Complete with 1 mould and 24 pigs of metal $4.95.

GILBERT KASTER KIT

SEND FOR BIG FREE MAGAZINE—Tells you all about Kaster Kit. 36 pages of scientific news and exciting pictures. Free if you mail coupon at once.

The A. C. Gilbert Co., 645 Erector Square,
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Send—free—your big, new 36 page magazine.

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Street..

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MAKE MONEY IN YOUR WORKSHOP
Build furniture, auto trailers, canoes, iceboats, cruisers, sailboats and electric refrigerators described in
FREE BLUEPRINT BOOKLET
MODERN MECHANIX PUBLISHING CO.
GREENWICH, CONN.

FREE How To Secure A Government Position

Tells About These and Other Positions in the Classified Service

STOREKEEPER (Liquor) GAUGER,
$2000-$2500 a year
FILE CLERK, $1260-$4000 a year
CUSTOMS POSITIONS, $1260-$3300 a year

FREE BOOK tells how I can help you get a Government Job. For 8 years I was Civil Service Examiner—have helped thousands. If citizen 18 to 50, you may qualify. Get ready NOW for a Government position. Send for free book about my instruction. Write or mail coupon TODAY.

HOW TO SECURE A GOVERNMENT POSITION

A. R. PATTERSON,
Patterson School, 4312 Case Bldg., Rochester, N. Y.
Please send me your free book "How to Secure a Government Position."
Name ....

Address ....

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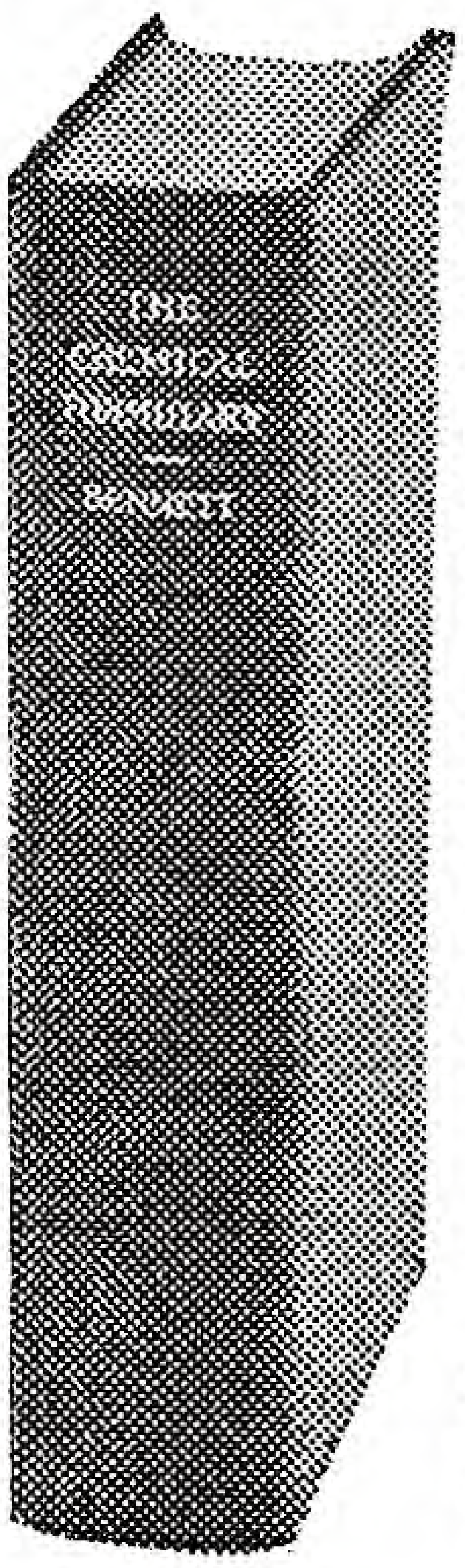
In This One Indispensable Book



In this one big book you have at your fingertips practical commercial formulae for making thousands of useful products for your own use and for profitable manufacture. Brand new, encyclopedic in scope, arranged for quick reference, it is exactly the book that every commercial chemist, large or small, has long wanted. 600 Meaty Pages of formulae including many patented, scarce and little known processes, many published for the first time. *Collected by over 60 outstanding industrial chemists and technicians— every formula proved successful by actual test and experience.*

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Thousands of Products

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Alloys
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Asphalt
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Candles
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Catalysts
Celluloid
Cement
Cream, Cold
Coffee Substitutes
Colors for Oils
Decolorizing Preparations
Dental Cement
Depilatories
Disinfectants
Dyes
Electrotyping
Etching Compounds
Explosives
Fertilizer
Fireproofing
Fireworks
Fluxes
Fly Killer
Food Specialists
Gems, Artificial
Glass Polish
Glues
Gold, Plating
Grease Lubricating
Hair Setting Liquids
Hair Tonics
Incense
Inks
Insulation
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Kalsomines
Lacquers
Latex Paint
Leather Polishes
Liniment
Liquors
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Nickel Plating
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Ointments
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Patent Leather
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Polish, Auto
Porcelain
Preservatives
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Waterproofing
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and thousands more

ONE FORMULA ALONE MAY BE WORTH HUNDREDS OF DOLLARS TO YOU

Every formula in this book is of practical, commercial value. The volume is not merely a collection of "household stunts" or experiments for the amateur, but a mine of money-making ideas for everyone concerned with commercial chemistry. In addition, you will find it a quick-reference book for a vast amount of information that you need in your daily work. Send for your copy today.

EXAMINE IT FREE

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D. VAN NOSTRAND CO.
250 Fourth Ave., New York

Send me on approval The Chemical Formulary. Within 5 days after I receive it, I can return it to you and owe nothing. If I keep it I will send you $2.00 as first payment and I will pay $2.00 monthly thereafter for 2 months—$6.00 in all. (5% discount for cash. Same return privilege.) (M. M. 12-36)

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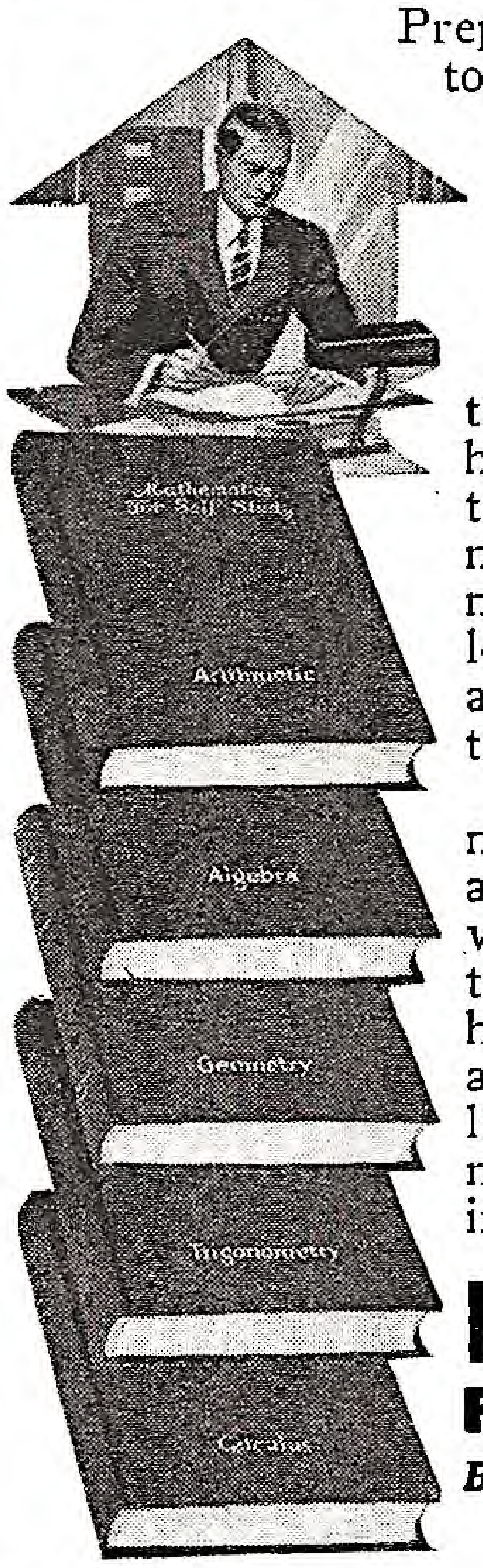
A Complete Mastery of MATHEMATICS



Prepare now to advance yourself to an important job by *Mathematics Training. Mathematics* is the foundation of all mechanical and scientific work, and of all business or industry based on science. Without this essential knowledge even the most capable man is left behind while others forge ahead to better jobs, bigger contracts, more money. You need mathematics to solve technical problems and to improve, speed up and check on your work and the work of others.

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Pratt Institute

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Mr. Thompson, the author of these books, has had many years' experience in mathematical training. He presents each practical method and problem in the clearest, simplest way. He gets right down to the kind of information that you need in your daily work.

Send No Money—Mail This Coupon for FREE EXAMINATION

D. VAN NOSTRAND CO., INC.
250 Fourth Ave., New York

Send me MATHEMATICS FOR SELF-STUDY in 5 volumes. Within 10 days I will either return the books or send you $2.95 as first payment and $2.00 per month for 3 months—total $8.95 (5% discount for cash). (M.M.-12-36)

Name ....
Address ....
City and State ....
Reference ....
Address ....

☐ FOR FREE CATALOG of best books of practical instruction and technical information, check here. If you do not want **Mathematics for Self-Study** cross out paragraph above.

Learn to Make $30 $50 $75 a Week!

J. E. SMITH, Pres., National Radio Inst. The man who has directed the home study training of more men for the Radio Industry than any other man in America.

Here's Proof
THAT MY TRAINING PAYS

WORKS FOR STATE OF ILLINOIS

"If I had not taken your Course I would still be digging ditches. I just started to work for the State of Illinois, operating their 1,000 watt transmitter. If anyone wants to write me about your Course, I shall be glad to answer." R. S. LEWIS, 126 E. Ashe St., Springfield, Ill.

PICKED UP $1800 WHILE LEARNING

"I picked up $1800 while studying and I call that easy money—the time I gave my Radio work did not interfere with my other business." OTIS DENTON, 14105 Lorain Avenue, Cleveland, Ohio.

MADE UP TO $400 A MONTH

"I was working in a garage with no future in sight. My wife and I decided to put aside enough to pay for your Course. We have not regretted it. I have made as high as $400 a month in Radio." E. G. WOLFE, 1202 Eden St., Elkhart, Ind.

$10 TO $25 A WEEK IN SPARE TIME

"I am making from $10 to $25 a week in spare time while still holding my regular job as a machinist. I owe my success to N. R. I."—WM. F. RUPP, 130 W. 6th St., Conshohocken, Pa.

I will Train You at Home for good spare time and full time JOBS IN RADIO

Do you want to make more money? Radio offers you many opportunities for well-paying spare time and full time jobs. And you don't have to give up your present job or leave home and spend a lot of money to become a Radio Expert.

Many Radio Experts Make $30, $50, $75 a Week

Radio broadcasting stations employ engineers, operators, station managers and pay up to $5,000 a year. Spare time Radio set servicing pays as much as $200 to $500 a year—full time jobs with Radio jobbers, manufacturers and dealers as much as $30, $50, $75 a week. Many Radio Experts operate their own full time or part time Radio sales and service businesses. Radio manufacturers and jobbers employ testers, inspectors, foremen, engineers, servicemen, paying up to $6,000 a year. Radio operators on ships get good pay and see the world besides. Automobile, police, aviation, commercial Radio, and loud speaker systems are newer fields offering good opportunities now and for the future. Television promises to open many good jobs soon. Men I have trained are holding good jobs in these branches of Radio. Read their statements. Mail the coupon.

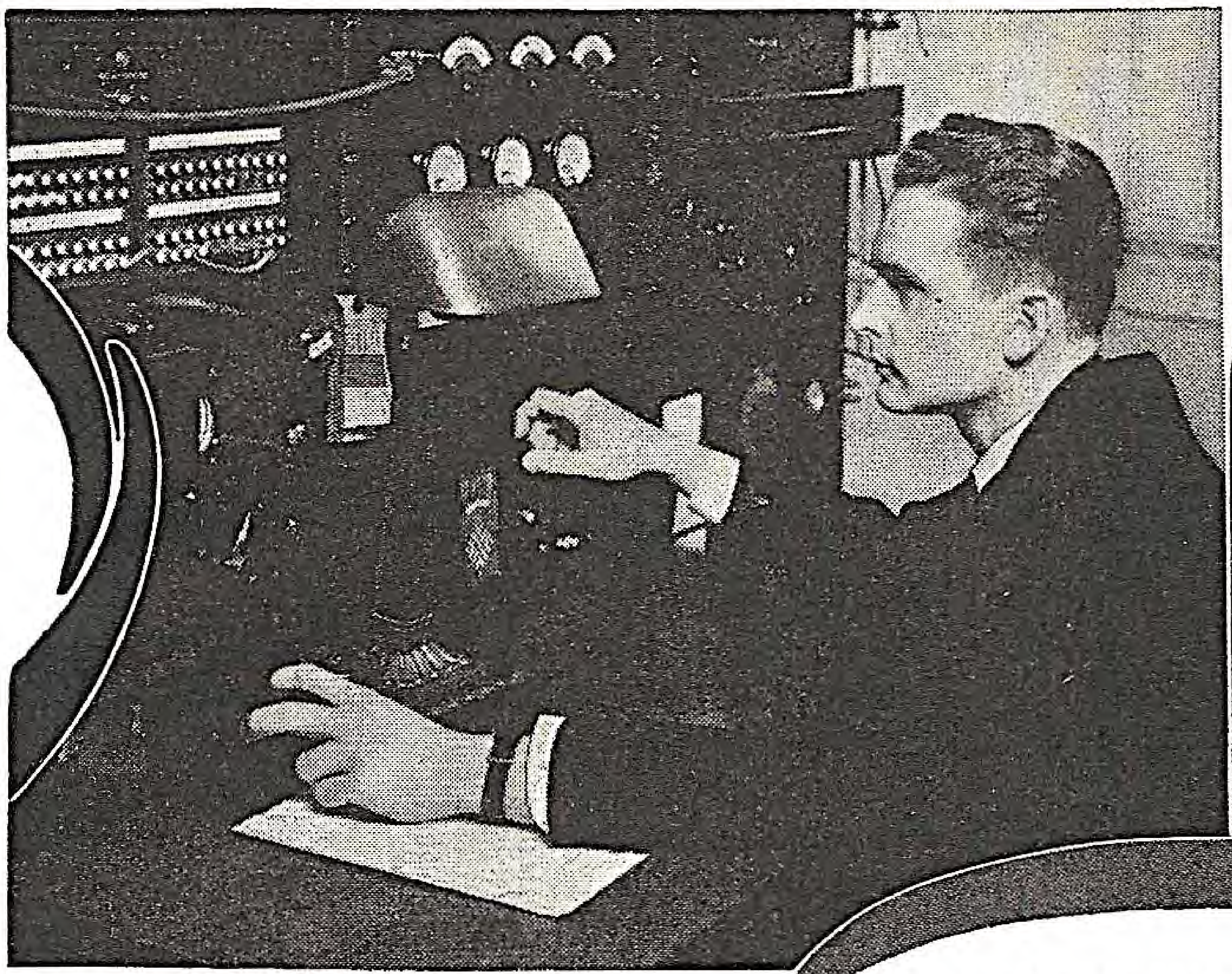
There's a Real Future in Radio for Well-Trained Men

Radio already gives jobs to more than 300,000 people. In 1935 over $300,000,000 worth of sets, tubes and parts were sold—an increase of 20% over 1934! Over 1,100,000 auto Radios were sold in 1935, 25% more than in 1934! 22,000,000 homes are today equipped with Radios, and every year millions of these sets go out of date and are replaced with newer models. Millions more need servicing, new tubes, repairs, etc. Broadcasting stations pay their employees (exclusive of artists) more than $23,000,000 a year! And Radio is a new industry, still growing fast! A few hundred $30, $50, $75-a-week jobs have grown to thousands in less than 20 years!

Many Make $5, $10, $15 a Week Extra in Spare Time While Learning

Practically every neighborhood needs a good spare time serviceman. The day you enroll I start sending you Extra Money Job Sheets. They show you how to do Radio repair jobs that you can cash in on quickly! Throughout your training I send you plans that make good spare time money—$200 to $500 a year—for hundreds of fellows. My training is famous as "the Course that pays for itself."

The tested way to Better Pay



BE A RADIO EXPERT

BROADCASTING STATIONS. Employ managers, engineers, operators, installation and maintenance men for fascinating jobs and pay up to $5,000 a year.

SET SERVICING. Spare time set servicing pays many $5, $10, $15 a week extra while learning. Full time servicing pays as much as $30, $50, $75 a week.

I Give You Practical Experience

My Course is not all book training. I send you special Radio equipment and show you how to conduct experiments and build circuits which illustrate important principles used in modern Radio receivers, broadcast stations and loud speaker installations. I show you how to build testing apparatus for use in spare time work from this equipment. This 50-50 method of training makes learning at home interesting, fascinating, practical.

You Get a Money-Back Agreement

I am so sure that I can train you successfully that I agree in writing to refund every penny you pay me if you are not satisfied with my Lessons and Instruction Service when you finish. I'll send you a copy of this agreement with my Free Book.

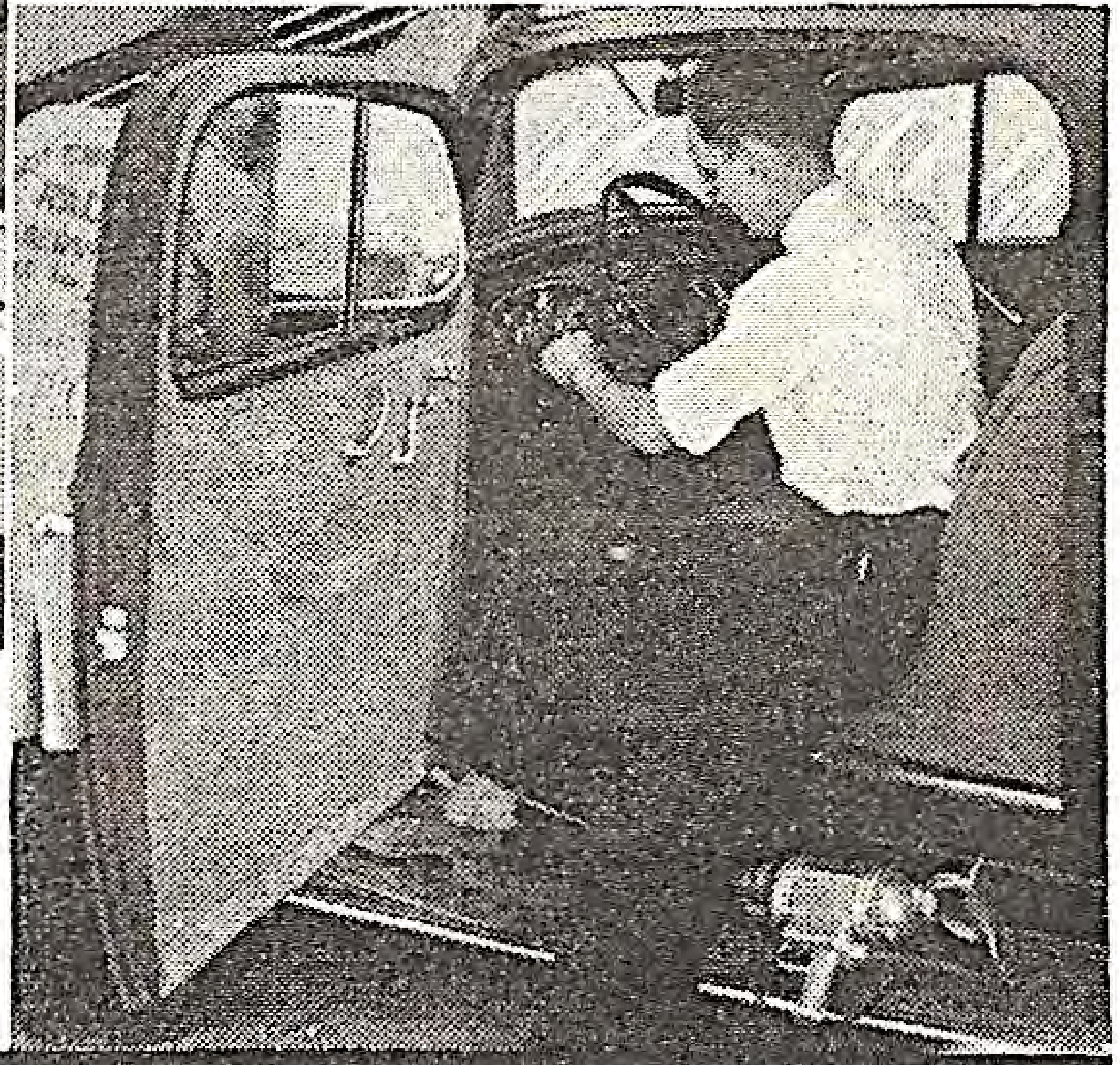
Find Out What Radio Offers You

Act Today. Mail the coupon now for "Rich Rewards in Radio." It's free to any fellow over 16 years old. It describes Radio's spare time and full time opportunities and those coming in Television; tells about my training in Radio and Television; shows you actual letters from men I have trained, telling what they are doing and earning. Find out what Radio offers YOU! MAIL THE COUPON in an envelope, or paste on a postcard—NOW!

J. E. SMITH, President
National Radio Institute
Dept. 6NH
Washington,
D. C.

LOUD SPEAKER SYSTEMS. Building, installing, servicing and operating public address systems is another growing field for men well trained in Radio.

AUTOMOBILE RADIO. Another new Radio field—selling, installing, servicing. One million or more auto owners will install radio sets within the next year.



THIS FREE BOOK
HAS HELPED HUNDREDS OF MEN MAKE MORE MONEY

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Mail to get 64 page Book FREE

J. E. SMITH, President, Dept. 6NH
National Radio Institute, Washington, D. C.

Dear Mr. Smith: Without obligating me, send "Rich Rewards in Radio," which points out the spare time and full time opportunities in Radio and explains your 50-50 method of training men at home in spare time to become Radio Experts. (Please Write Plainly.)

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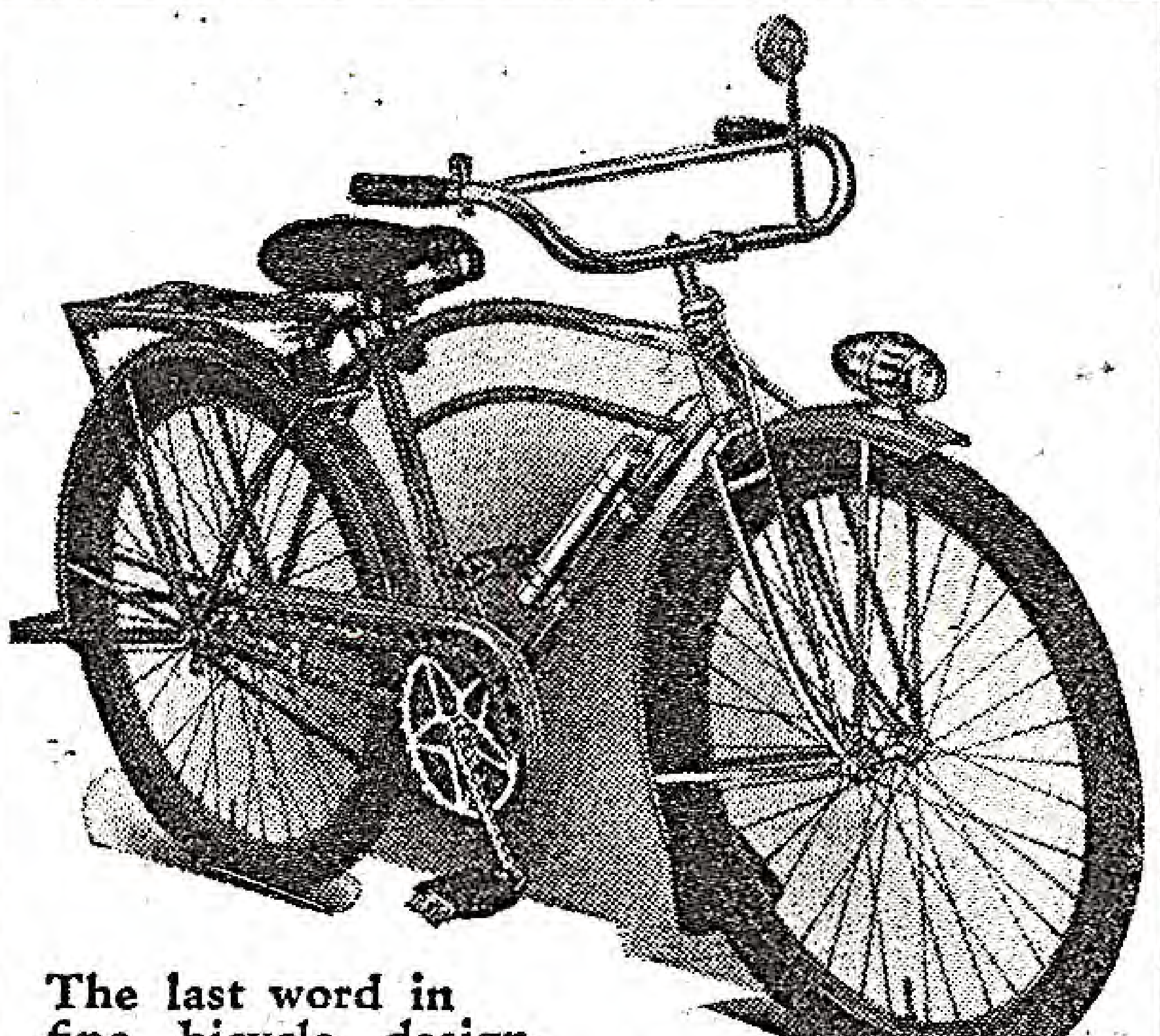

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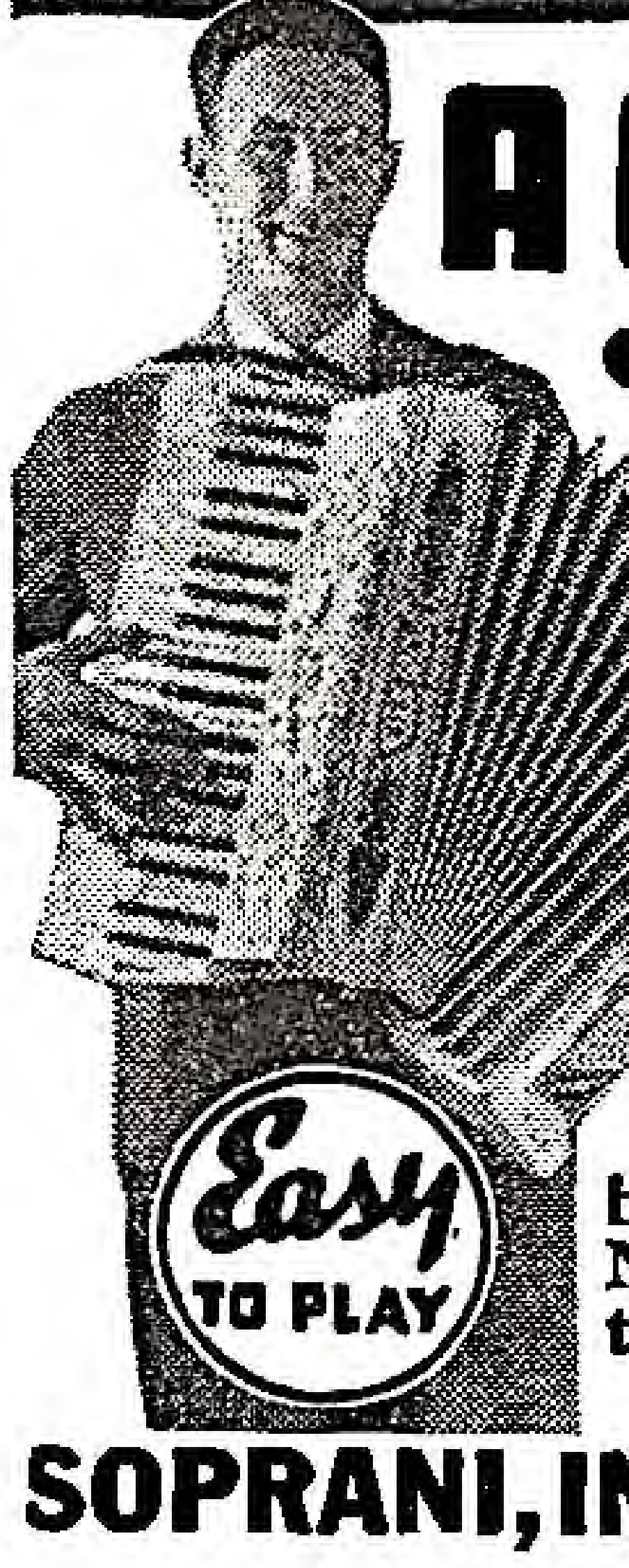

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Foundation Aids Danish Science

The Danish government has accepted an offer from the Rockefeller Foundation to donate 750,000 Kroner (about $166,600) to found an institute in Copenhagen for the study of race heredity and biology. The state will contribute free land for the construction of buildings and an additional 32,000 Kroner. Prof. Oluf Thomsen of Copenhagen, one of Denmark's leading scientists in the study of race heredity, will thus see his lifetime dream realized.

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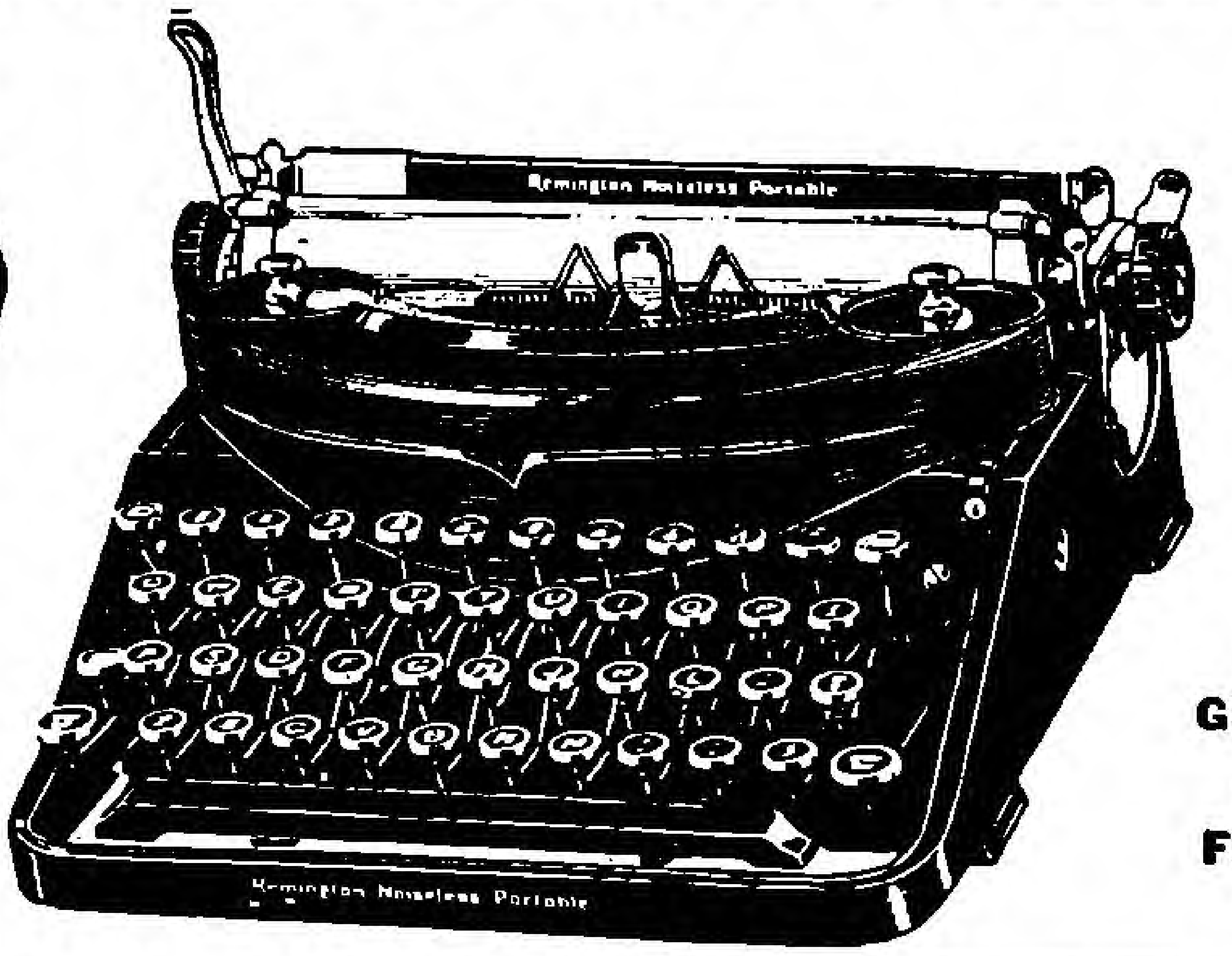

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AT LAST! The famous Remington Noiseless Portable that speaks in a whisper is available for only 10¢ a day. Here is your opportunity to get a real Remington Noiseless Portable direct from the factory. Equipped with all attachments that make for complete writing equipment. Standard keyboard. Automatic ribbon reverse. Variable line spacer and all the conveniences of the finest portable ever built. PLUS the NOISELESS feature. Act now while this special opportunity holds good. Send coupon TODAY for details.

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With your New Remington Noiseless Portable we will send you—absolutely FREE—a 19-page course in typing. It teaches the Touch System, used by all expert typists. It is simply written and completely illustrated. Instructions are as simple as A, B, C. Even a child can easily understand this method. A little study and the average person, child or adult, becomes fascinated. Follow this course during the 10-Day Trial Period we give you with your typewriter and you will wonder why you ever took the trouble to write letters by hand.

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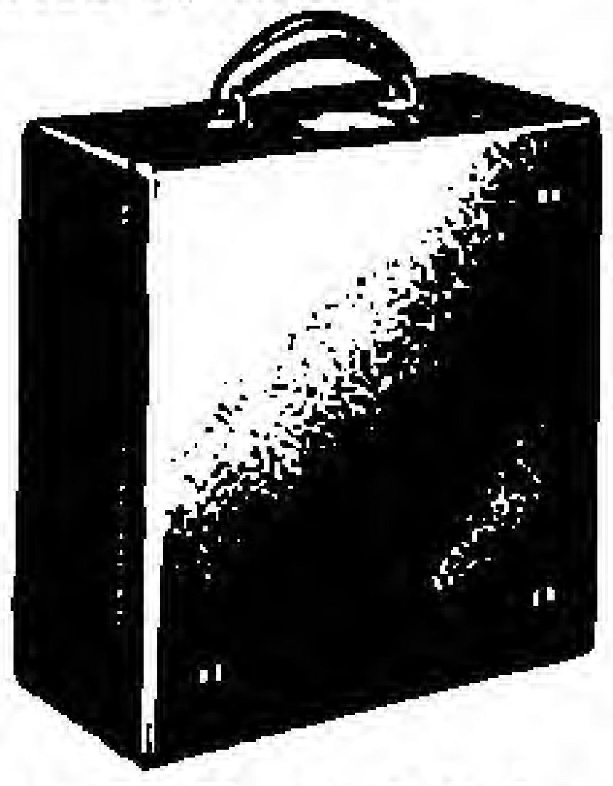

Also under this new Purchase Plan we will send you FREE with every Remington Noiseless Portable a special carrying case sturdily built of 3-ply wood. This handsome case is covered with heavy du Pont fabric. The top is removed by one motion, leaving the machine firmly attached to the base. This makes it easy to use your Remington anywhere—on knees, in chairs, on trains. Don't delay... send in the coupon for complete details!

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SPECIFICATIONS. Standard Keyboard. Finished in glistening black with chromium attachments. Takes paper 9.5 inches wide. Writes lines 8.2 inches wide. Standard size, 12 yard ribbon. Makes up to 7 clear, legible carbons. Back spacer. Full size platen. Paper fingers, roller type. Black key cards with white letters. Double shift key and shift lock. Right and left carriage release. Right and left cylinder knobs. Large cushion rubber feet. Single or double space adjustment. All the modern features plus NOISELESS operation.

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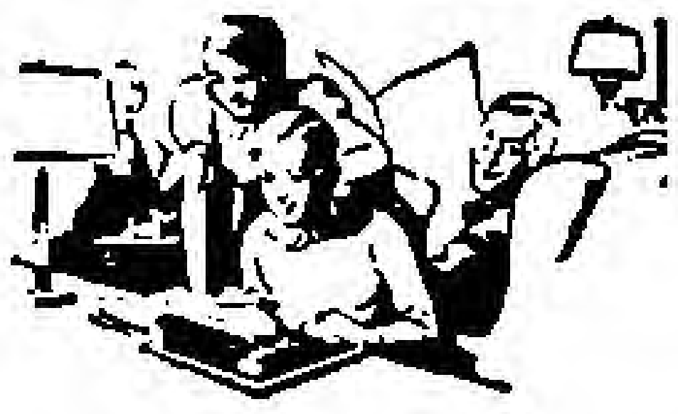
A GIFT FOR ALL THE FAMILY. If you want a gift for birthday, Christmas or Graduation . . . one Father, Mother, Sister or Brother will use and appreciate for years to come . . . give a Remington Noiseless Portable. We will send a Remington Noiseless Portable to anyone you name, and you can still pay for it at only 10c a day. Few gifts are so universally pleasing as a New Remington Noiseless Portable. Write today.



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Please tell me how I can get a new Remington Noiseless Portable typewriter, plus FREE Typing Course and Carrying Case, for only 10c a day. Also send me, without obligation, new illustrated catalogue.

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A frank man to PATENTS-INVENTIONS

THE world of invention moves on. About a hundred years ago people were saying, "There's nothing left to invent"—today we know that is one of the funniest things ever said. Just think what has happened in the last hundred years! Autos, radios, airplanes, and thousands of useful, practical devices for home, shop and office have been invented and put on the market. Inventors are constantly making the world a better place to live in. Did you see a notice in the paper that an obscure worker, Hans Wach, has invented a simple device to utilize exhaust steam on steam boats. *Already, the report states, the steam ship lines have saved more than $15,000 in fuel bills with his invention.* Almost in the same breath the Dept. of Commerce announces that it will soon test out a new non-crashable aeroplane, which the average man can learn to fly in a day, which will travel at 110 miles an hour and sell at the price of a cheap automobile. An unknown Seattle man has invented a robot to go 5,000 feet under the sea and recover millions and millions of dollars worth of gold lying at the bottom of the ocean since the days of the early Spaniards.

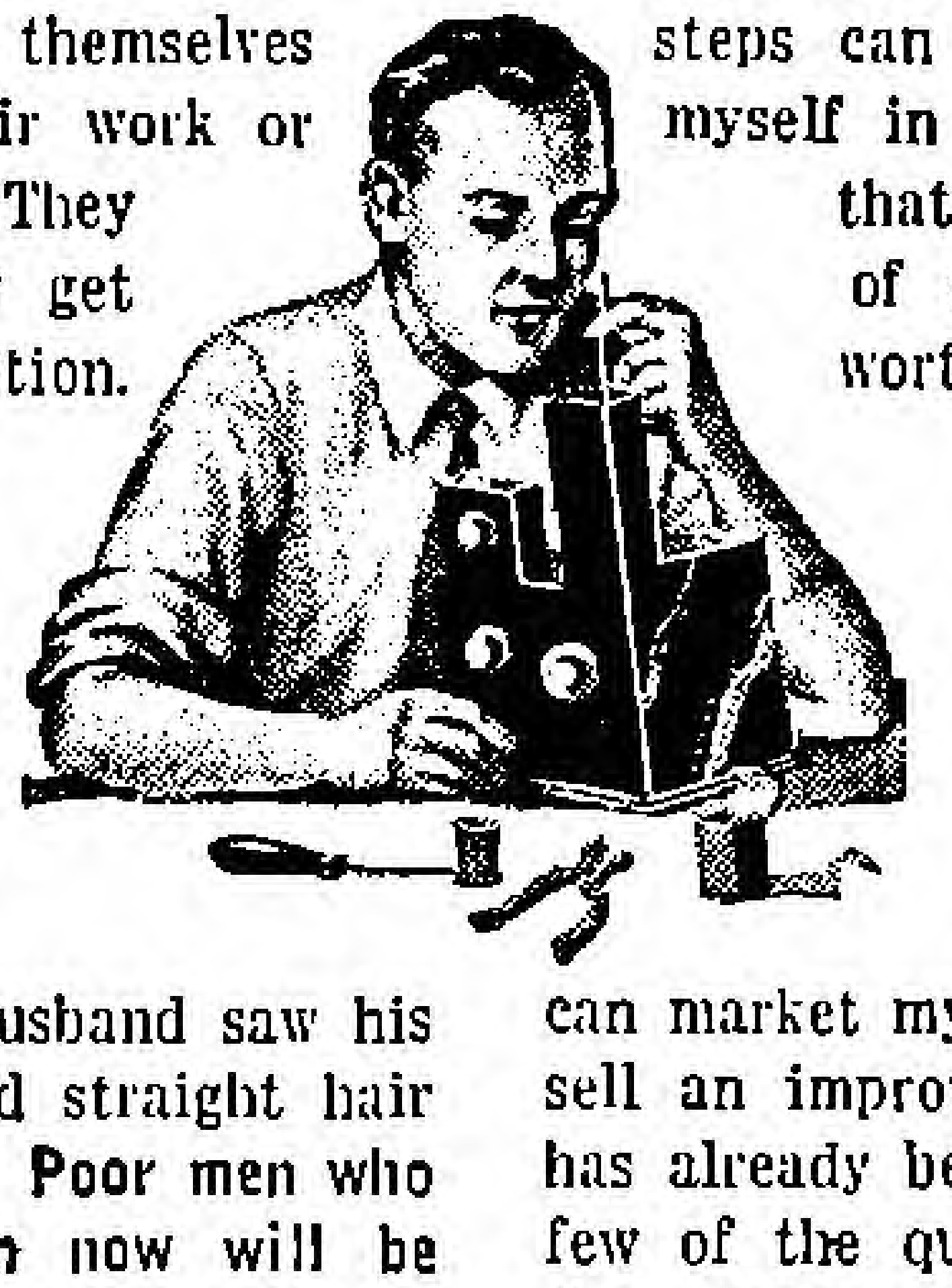
Remember this: For every outstanding big invention there are thousands of small, simple things for use in the home, the office, the factory, on the farm, on every sort of travel conveyance. Little articles like you find on the counters of a 10-cent store, hardware store, drug store, toy and novelty shop.

Many Little Ideas Have Big Commercial Possibilities

A person finds something he's using doesn't work right, or it's clumsy, or costs too much. He gets a happy thought. He improves the old Article. That's contribution to human progress. That's the way that many, many men have reached the goal of financial comfort, independence and even wealth. Most of the things millions of us use didn't come from the brains of engineers and physicists. They came from the mind and maybe the crude home work bench of Mr. Average Man, busily engaged in earning his bread and butter at whatever chance or circumstance has given him to do. The "little" man's opportunity as an inventor was never greater than it is today.

Who Are Inventors?

You'd be amazed at the men we contact in the course of a busy year. Most of them do not consider themselves inventors at all. During their work or leisure they get an idea. They work it out on paper. They get in touch with us about Protection. Did you know that a dentist invented the stock ticker, a school teacher the telephone, a farmer the typewriter, an artist the telegraph? Did you know that the crinkly hair pin—sold by millions now—came about because a husband saw his wife twisting the old-fashioned straight hair pin to make it stay in place? **Poor men who have no thought of invention now will be financially well-fixed in a few years because of a happy thought that the world could use to advantage.**



Can You Answer These Questions?

Ask yourself these questions: How do the Patent Laws protect me? What easy steps can I take, without cost, to put myself in position to support my belief that I am the *first* man to think of *my invention*? Is a Patent worth the cost? Do I need a model? Should I try to sell my Invention before I have it Patented? Is there any safe, business-like way to secure financial help? If I do apply for a Patent how shall I reach people who can market my invention? Can I protect and sell an improvement on some invention that has already been patented? These are but a few of the questions which usually confront the average man. You need the answers! **YOU CAN HAVE THEM, without cost, trouble, or delay.**

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For more than thirty-six years, this firm has been helping men with an inventive turn of mind. We maintain a large staff of trained, experienced specialists—**Registered Patent Attorneys, Draftsmen, and Searchers to help our clients secure all the protection to which they are entitled.** Fees are reasonable. Deferred payments frequently arranged. Questions promptly answered. Write us frankly with absolute assurance that what you say will be treated with strictest secrecy. **But FIRST, send for the FREE BOOKS shown on the opposite page.** They are filled with facts, pictures and suggestions. They tell you things about Patents, Inventions and Selling Inventions that we have learned in our long experience. **They may save you time, expense, EVEN LATER DISAPPOINTMENT.** Simply fill in the coupon. No charge, no obligation. **Write us today.**

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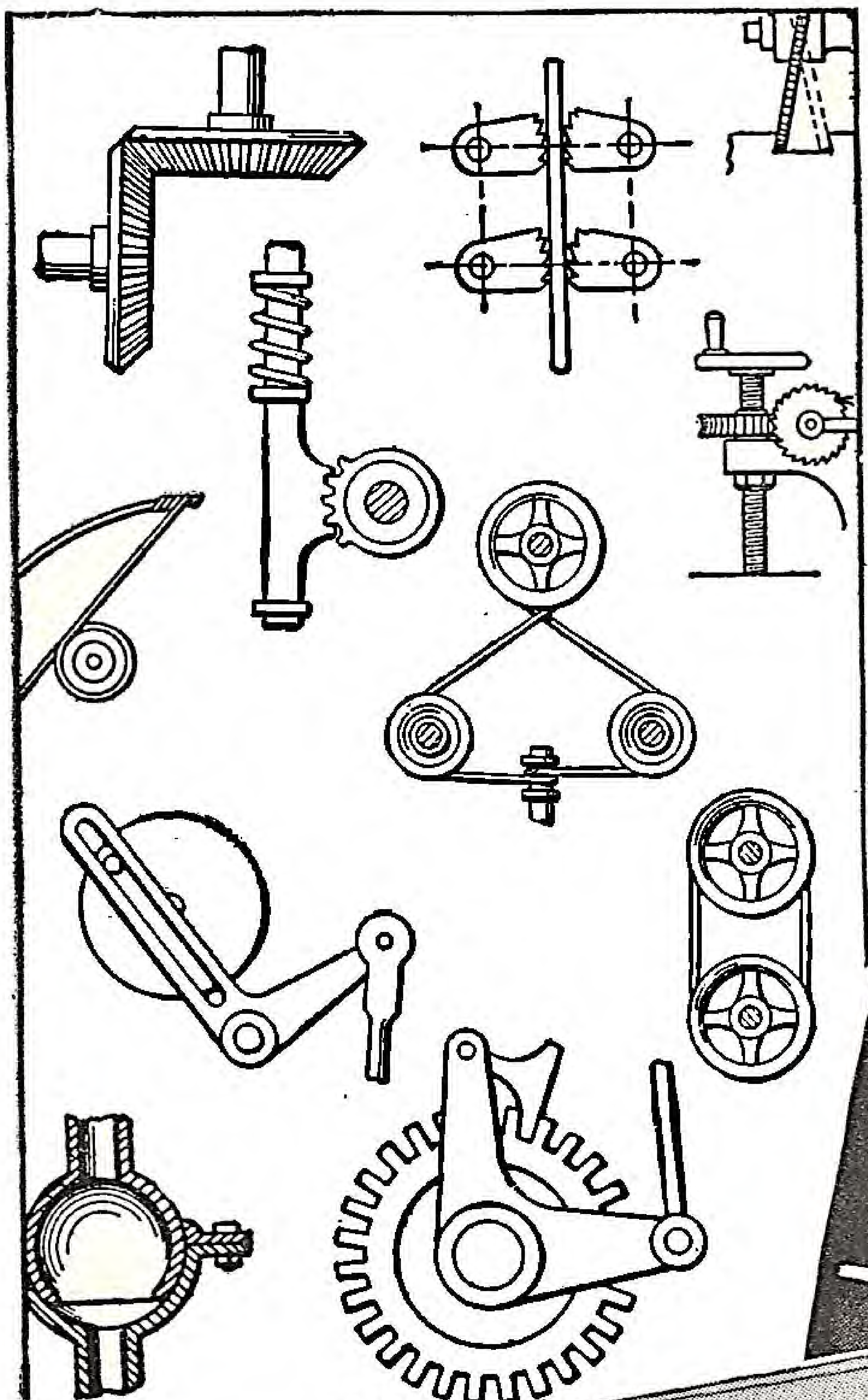

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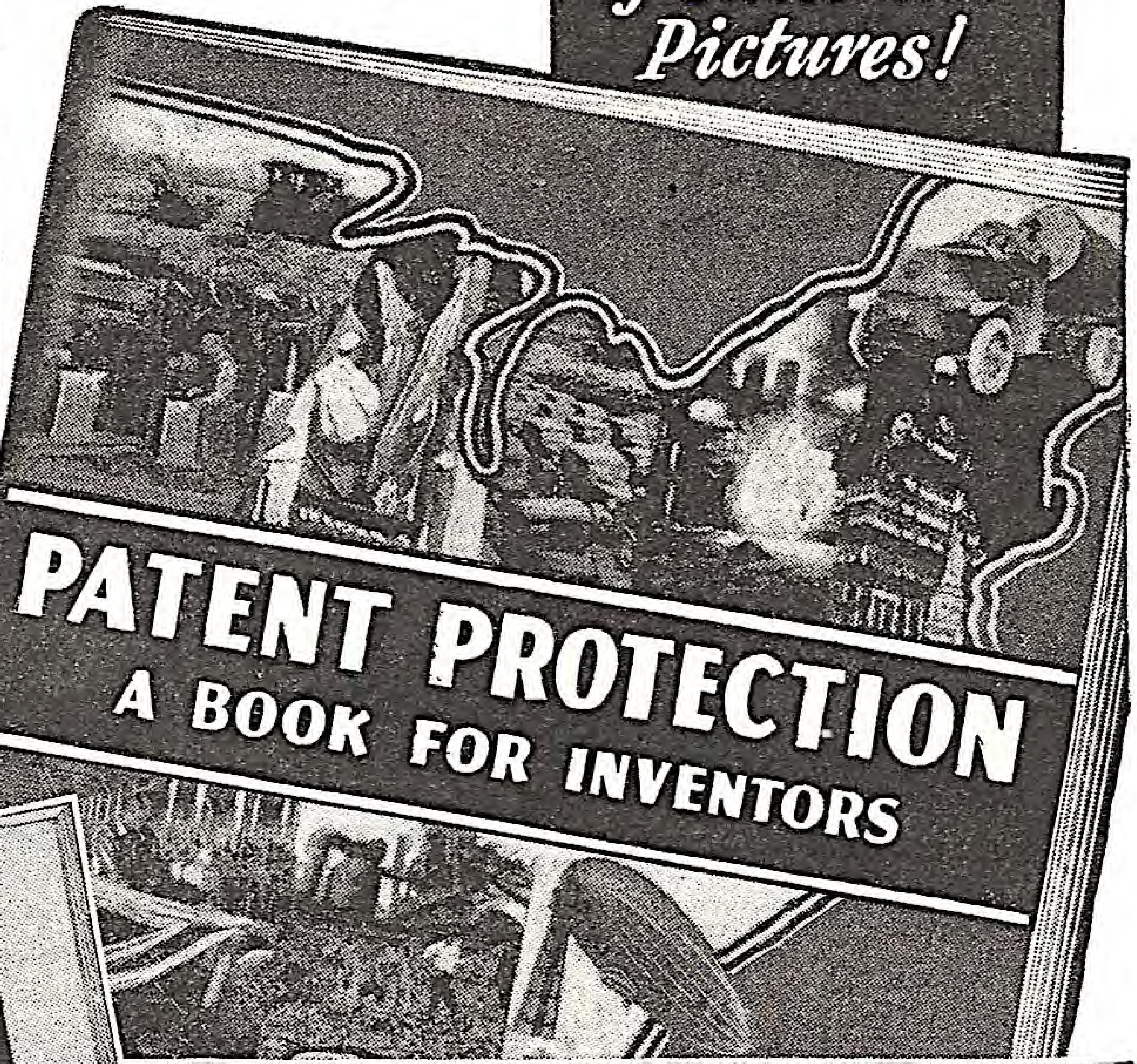

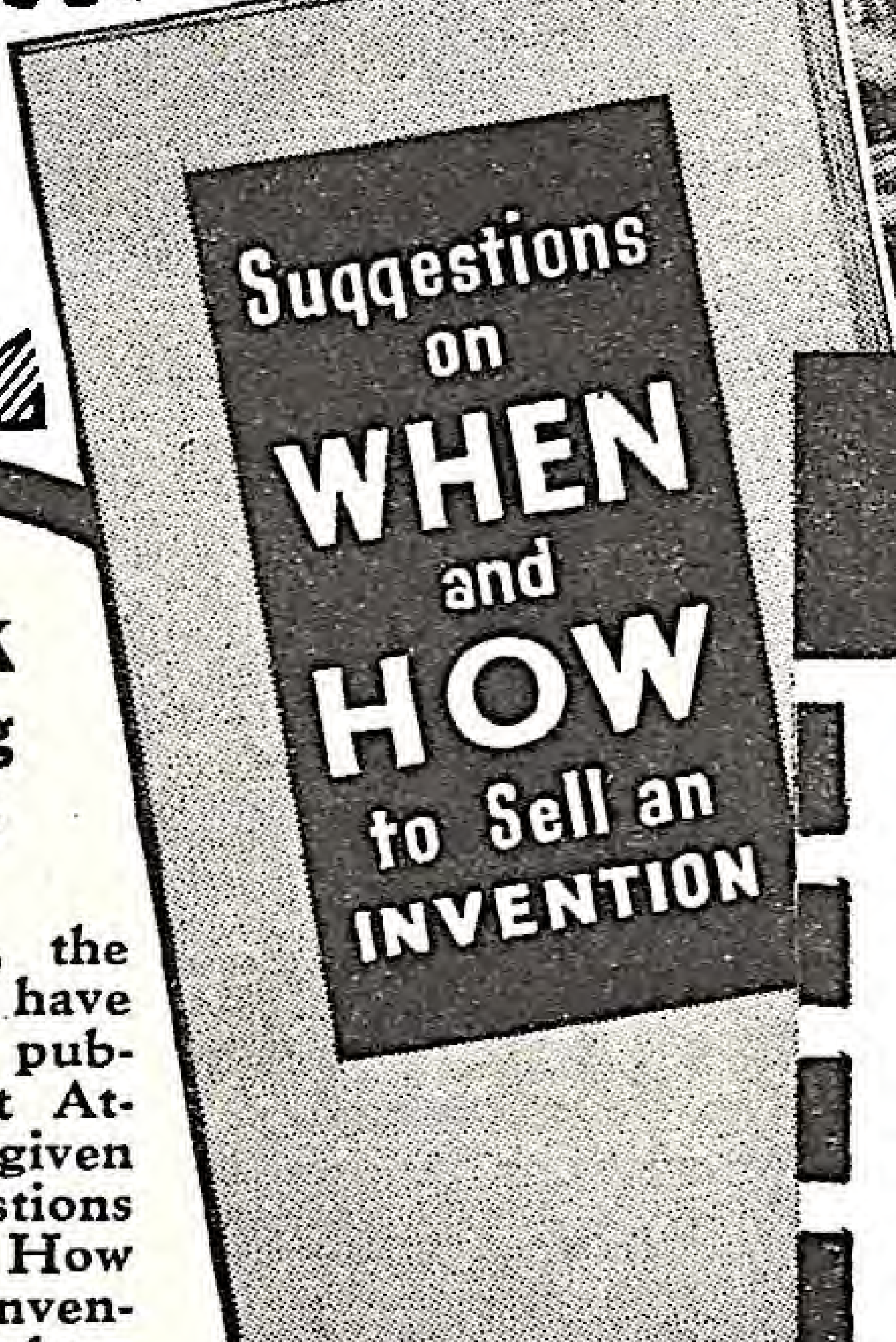

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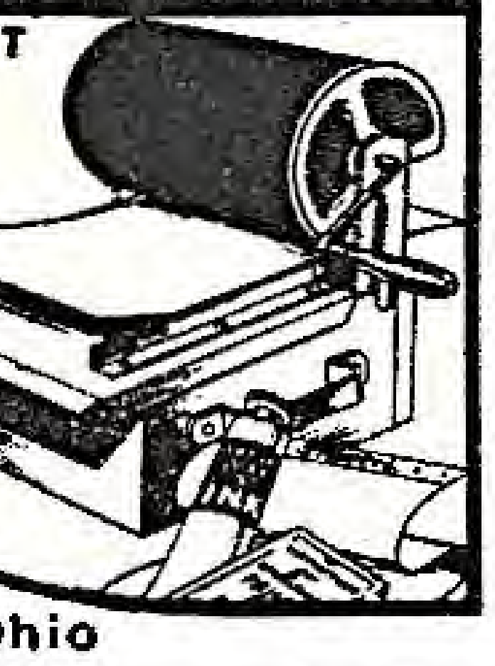

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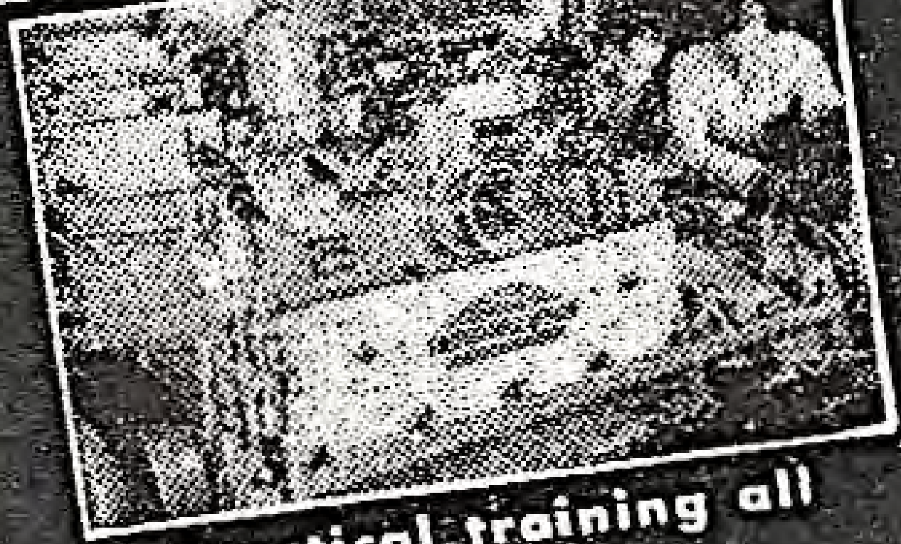

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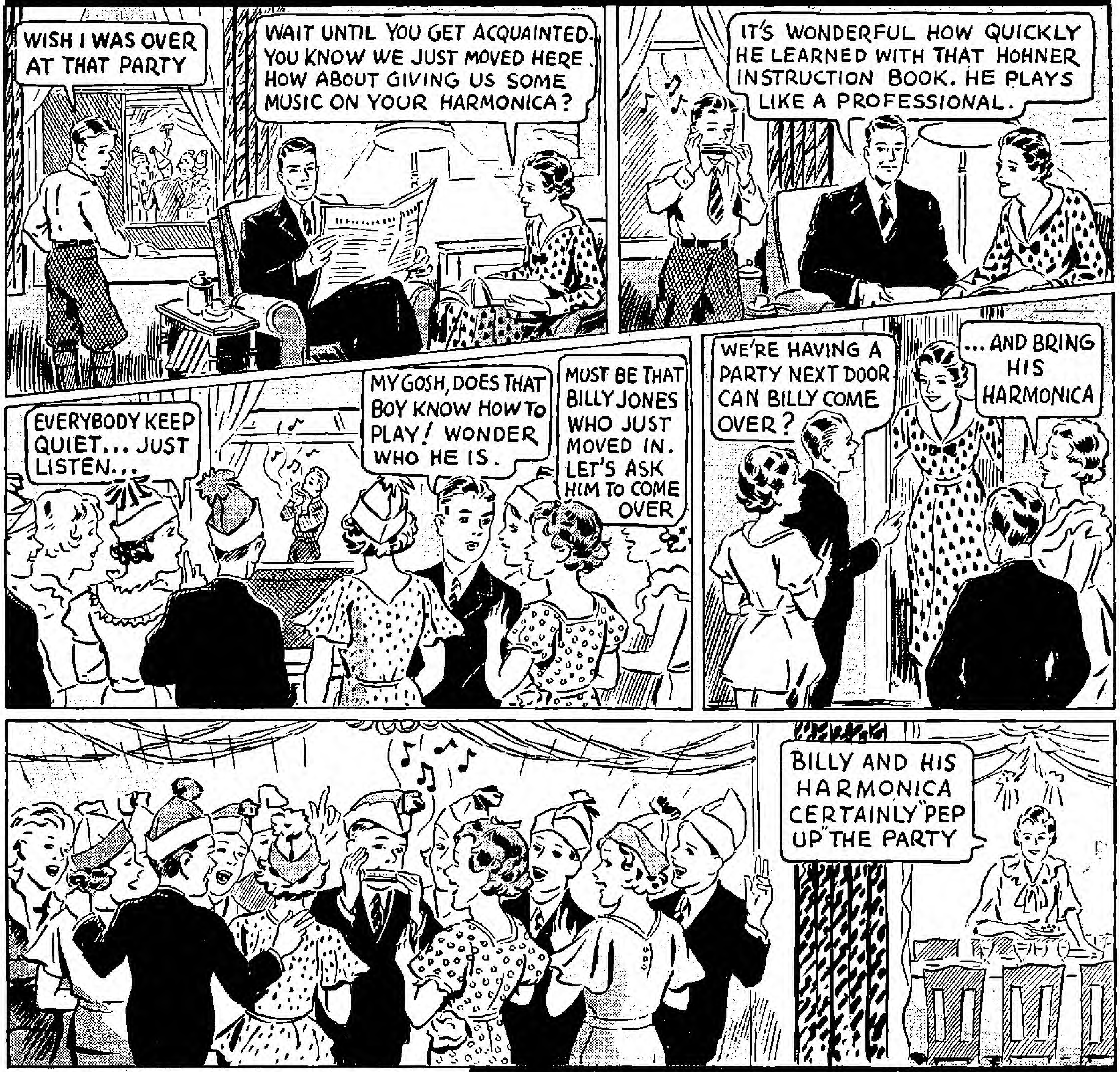
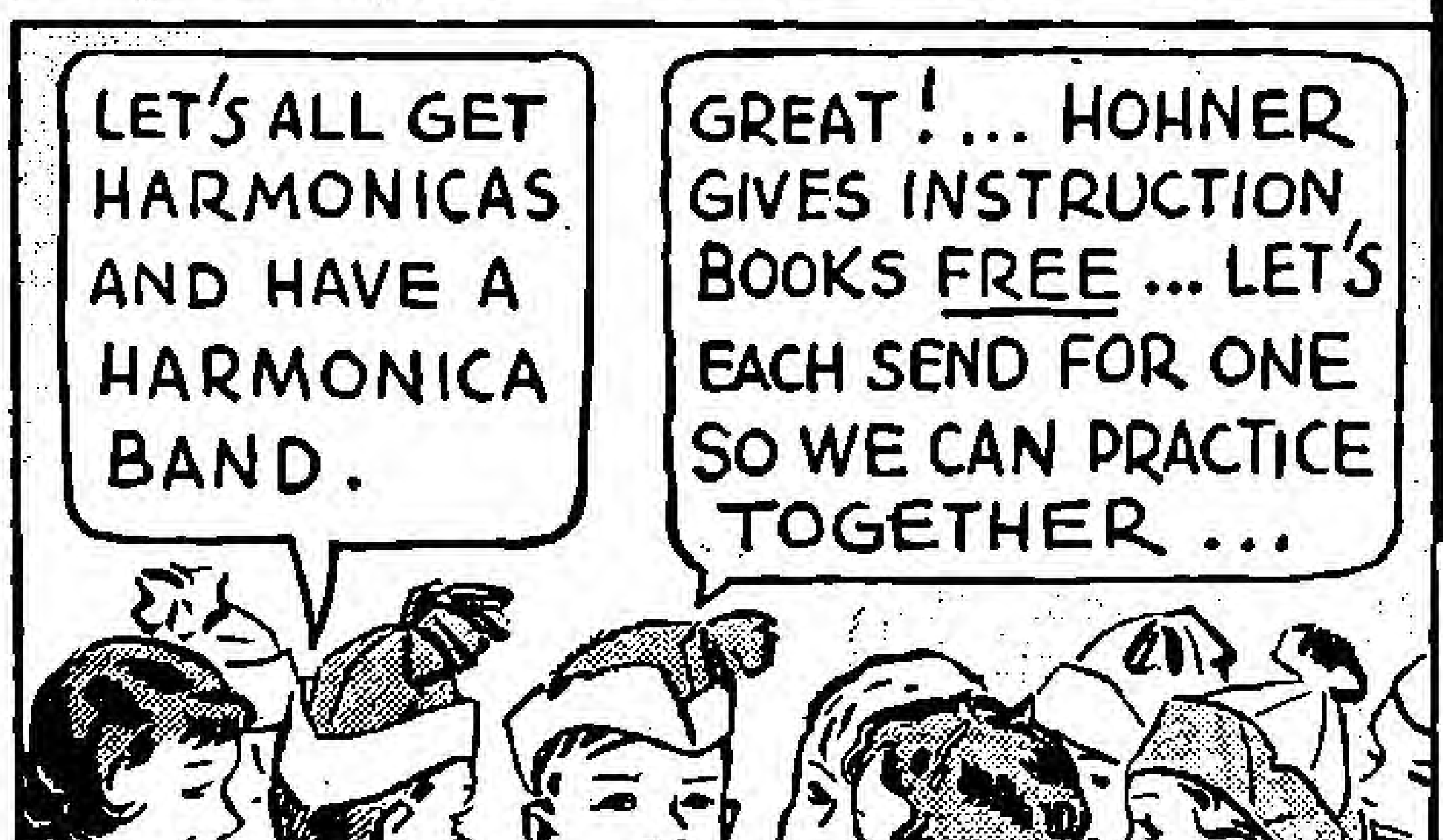
Billy Gets an Unexpected Invitation


WISH I WAS OVER AT THAT PARTY
WAIT UNTIL YOU GET ACQUAINTED. YOU KNOW WE JUST MOVED HERE. HOW ABOUT GIVING US SOME MUSIC ON YOUR HARMONICA?
IT'S WONDERFUL HOW QUICKLY HE LEARNED WITH THAT HOHNER INSTRUCTION BOOK. HE PLAYS LIKE A PROFESSIONAL.
EVERYBODY KEEP QUIET... JUST LISTEN...
MY GOSH, DOES THAT BOY KNOW HOW TO PLAY! WONDER WHO HE IS.
MUST BE THAT BILLY JONES WHO JUST MOVED IN. LET'S ASK HIM TO COME OVER
WE'RE HAVING A PARTY NEXT DOOR CAN BILLY COME OVER?
...AND BRING HIS HARMONICA
BILLY AND HIS HARMONICA CERTAINLY "PEP UP" THE PARTY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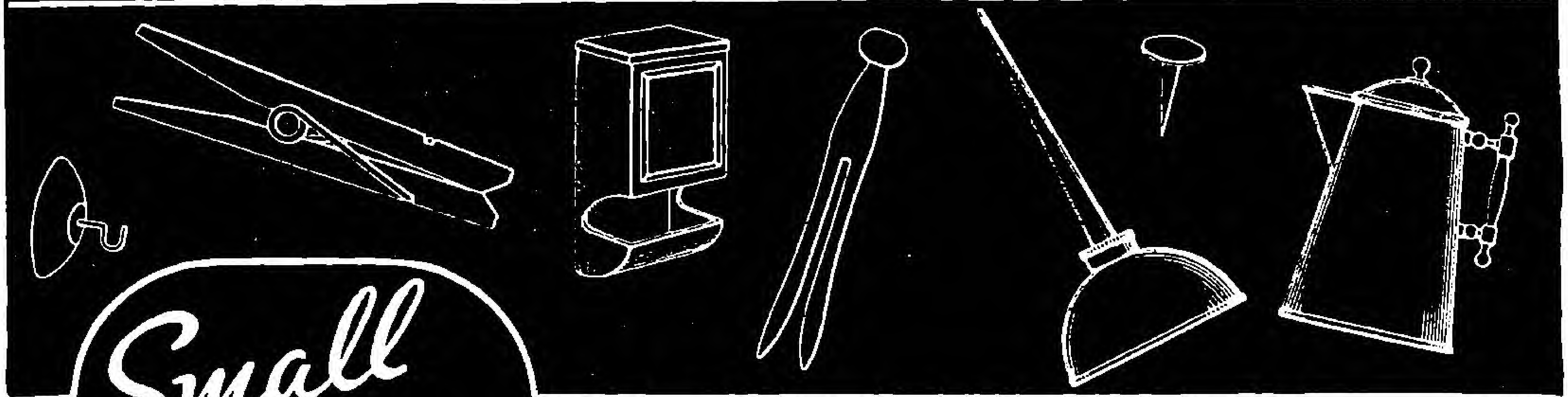

Small Ideas THAT HAVE BUILT BIG BUSINESSES

IDEAS do not have to be complicated to be profitable when Patented. The 5c and 10c stores flourish on simple Patented products which are commercially successful. The zipper, safety pin, thumb tack, paper clip, collar button—all simple, yet familiar inventions—brought their inventors rich rewards. If you have a Patentable idea—act to protect it. Many of the most useful, widely popular, greatly profitable, and extremely successful inventions have been very simple ones. You have only to look at the devices we have pictured here to realize how a simple idea may become a utility bought by a hundred thousand or a million people soon after it is produced. Don't be afraid that the simplicity of your idea makes it valueless. The thing that you find so simple that you wonder why a thousand other people haven't already done it is often the invention worthwhile.

HOW OTHER INVENTORS GOT STARTED

The list of men who succeeded in invention with only a poor boy's start is a very long and noble one. Poverty, hardships, lack of friends, distance from the market—these could not hold back Bell, Edison, Eastman, McCormick, Whitney and others. Everyone cannot succeed. But every man can try. Courage, sacrifice, and hard work may bring you a measure of the success these men had. Lack of mechanical ability is not a serious draw-back. You can always get someone able to build a model, draw a detailed design, or otherwise materialize your idea for you. The big draw-back is discouragement.

Your idea for a practical article or an improvement upon an old one should be patented NOW. Frequently many of the thousands of applications filed in the U. S. Patent Office each year are for the same or almost the same idea. In such a case, the burden of proof rests with the last application filed. Sometimes a delay of even a few days in filing the application means the total loss of the patent. LOSE NO TIME.

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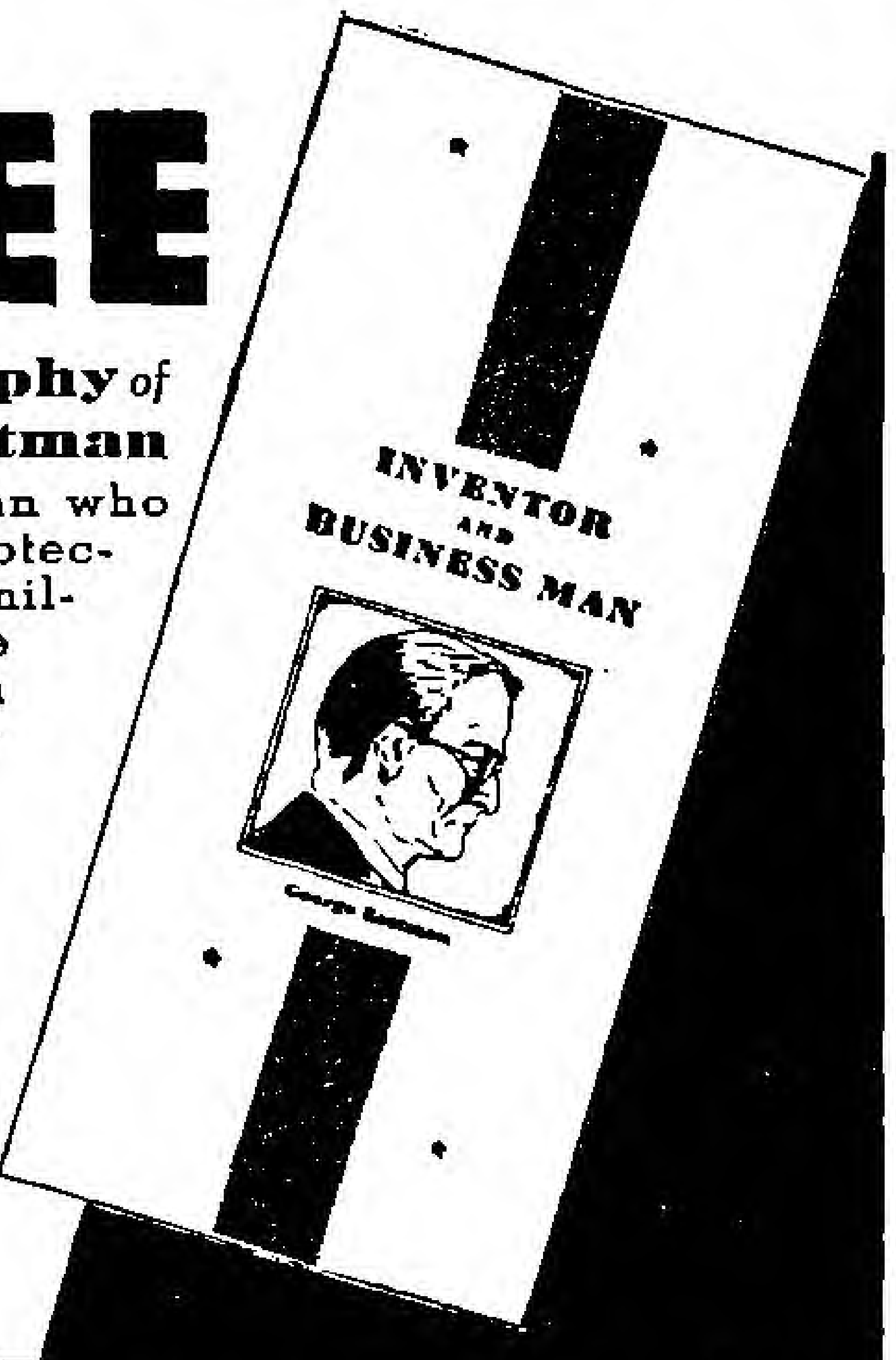

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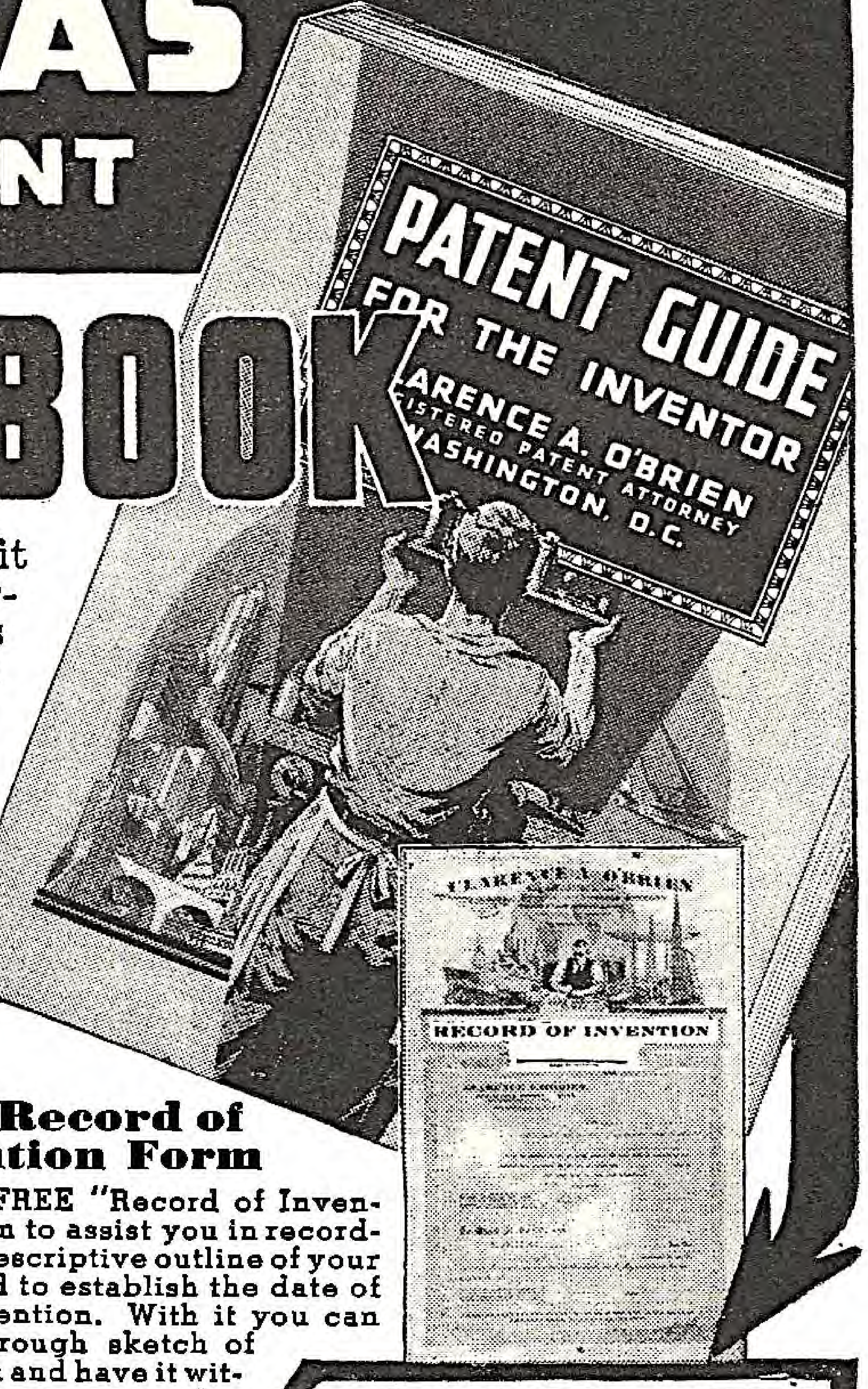

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MM EXPERTS SOLVE READERS' EVERYDAY PROBLEMS

A SIMPLE WAY TO LOCK THE CAR

My roadster is provided with an ignition switch which requires no key. While it originally had a gear lock this became broken and there is no way to repair it. Can you suggest a simple method for locking the car so it cannot be removed while I am away?—D. V. Thorp, Wheeling, W. Va.

A simple method of locking your car would be to drill a 3/8" hole through the clutch arm about halfway between the pedal and the floorboard. In this hole insert an ordinary padlock so that the clutch cannot be disengaged when tramped upon. Since it would be impossible to take the car out of gear with the lock in place it would naturally be impossible for anyone to move the car.

A CEMENT WITH MARBLE FINISH

Is it possible to mix a cement that will dry with a glazed finish similar to the finish of polished marble? Can you supply a formula?—H. W. Hoefer, Troy, New York.

Fine sand, cement and lime are the secret to a smooth concrete. Even then it must be smoothed out with a moistened trowel after it starts to set. For artificial marble mix 100 lbs. marble dust or levigated chalk with 20 parts ground glass and 8 parts of fine lime. Cement may be added, if desired, for a binder. After thorough mixing concrete coloring may be mixed in. Smooth to a gloss with a moistened trowel.

NOVELTIES FROM CELLULOID SCRAP

I have often seen novelty jewelry made from old toothbrush handles and other pieces of old celluloid. Is it very difficult for the average person to make articles of this kind? How is the celluloid softened so that it can be bent into the shape of a ring or bracelet?—Albert Kary, Eureka, South Dakota.

Celluloid novelties can be easily made from scrap pieces of this material by softening the celluloid in acetone. This solution can be supplied by any chemical supply house and by many druggists. Before the celluloid is made pliable it should be cut and filed so as to remove printing, etc. After it has been shaped into a ring the joint is cemented with an adhesive made by dissolving small scraps of celluloid in acetone until a thick solution results.

CHEMICAL BATTERY FAILS TO WORK

Though I followed out the constructional details carefully the chemical battery described in the October MM failed to work for me. Must a special kind of zinc be used or is there several kinds of sal ammoniac salts?—Edgar Beuthiew, Wheatland, Ia.

The chemical battery calls for a saturate sal ammoniac solution, therefore you cannot expect this cell to function if only a few ounces of the salt are dissolved in water. Add sal ammoniac until the water will absorb no more. Sufficient salt will then be present to produce the necessary chemical reaction. As the water in the cell evaporates additional water may be added. The salt will last for a considerable length of time although the metal will be gradually eaten away.

WIND OPERATED PRESSURE TANK

Would it be practical to operate an air pump from a windmill, storing up the compressed air in tanks and using this air in turn to operate a 110-volt A. C. generator?—Virgil Flynn, Essex, Iowa.

To operate an electric light plant in the manner you describe would not only prove costly but impractical as it would require more air to operate the generator than was entering the tanks unless you wished to use current only one or two days a week.

(Editor's Note: Your questions will be answered personally and free of charge by MM experts provided they do not require special research or involve trade secrets. Names and addresses of manufacturers of new products described in this issue also can be obtained free upon request. Enclose a self-addressed and stamped envelope for reply. Address: Problems Editor, Modern Mechanix Publishing Co., Greenwich, Conn.)

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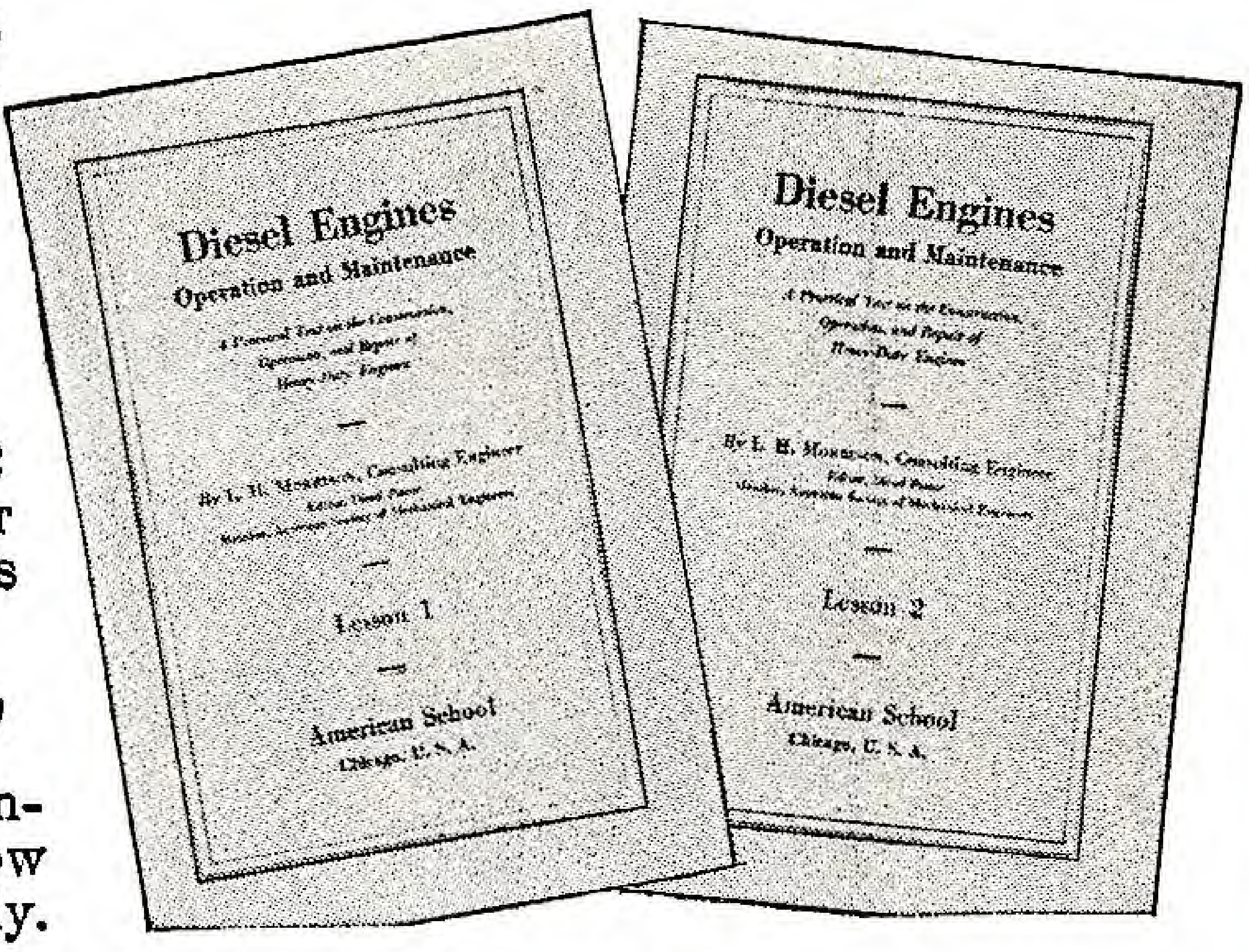

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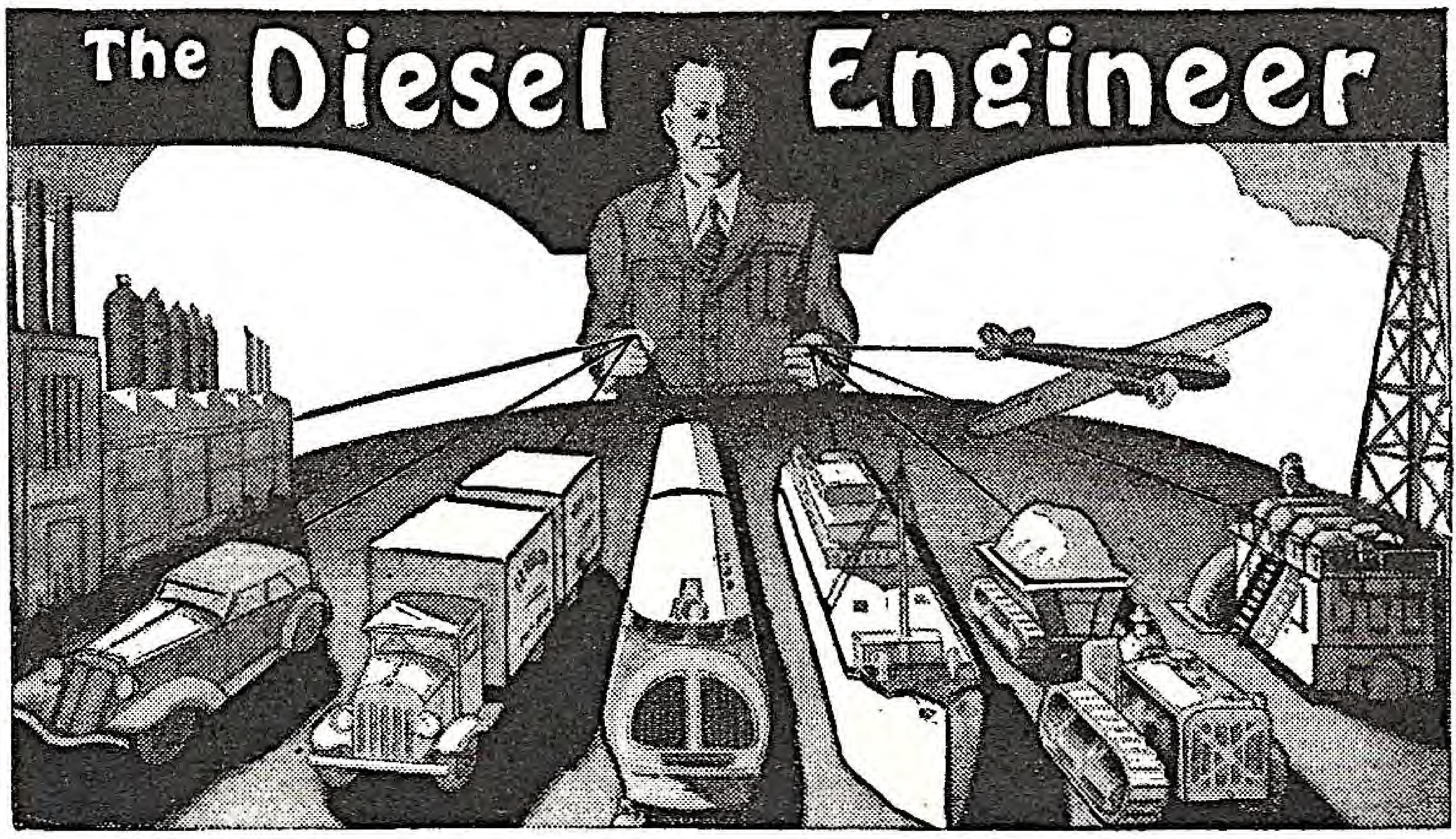

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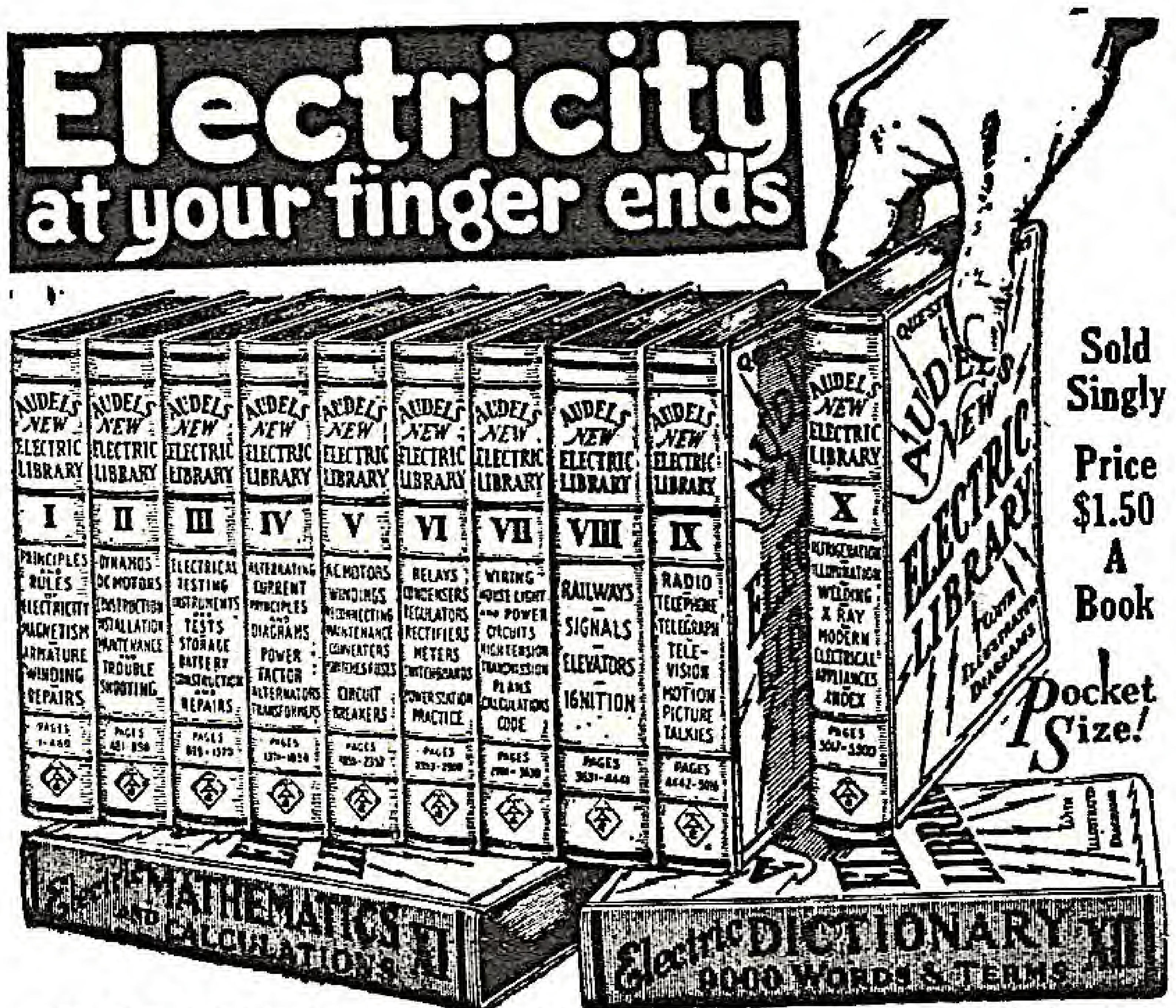

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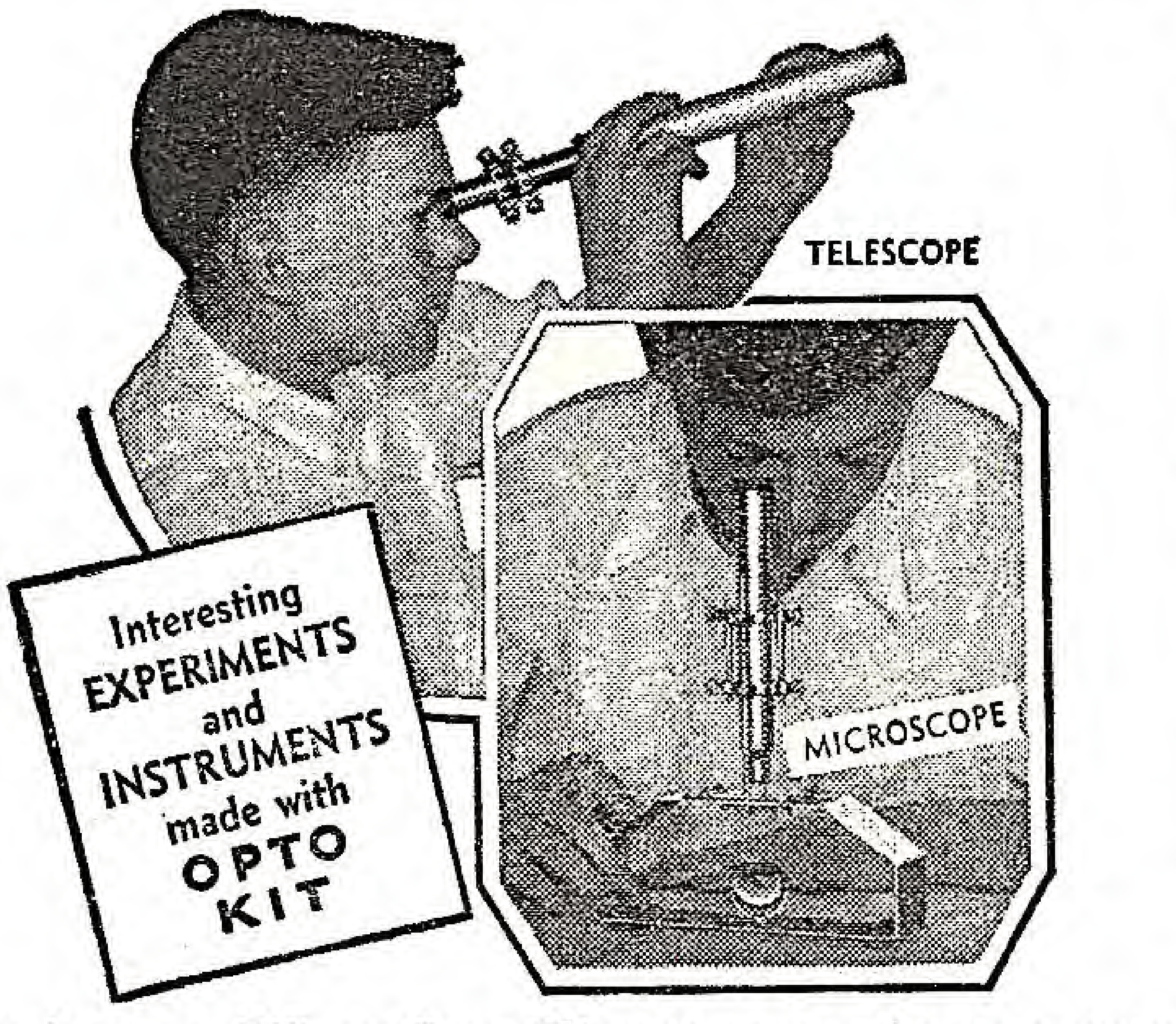
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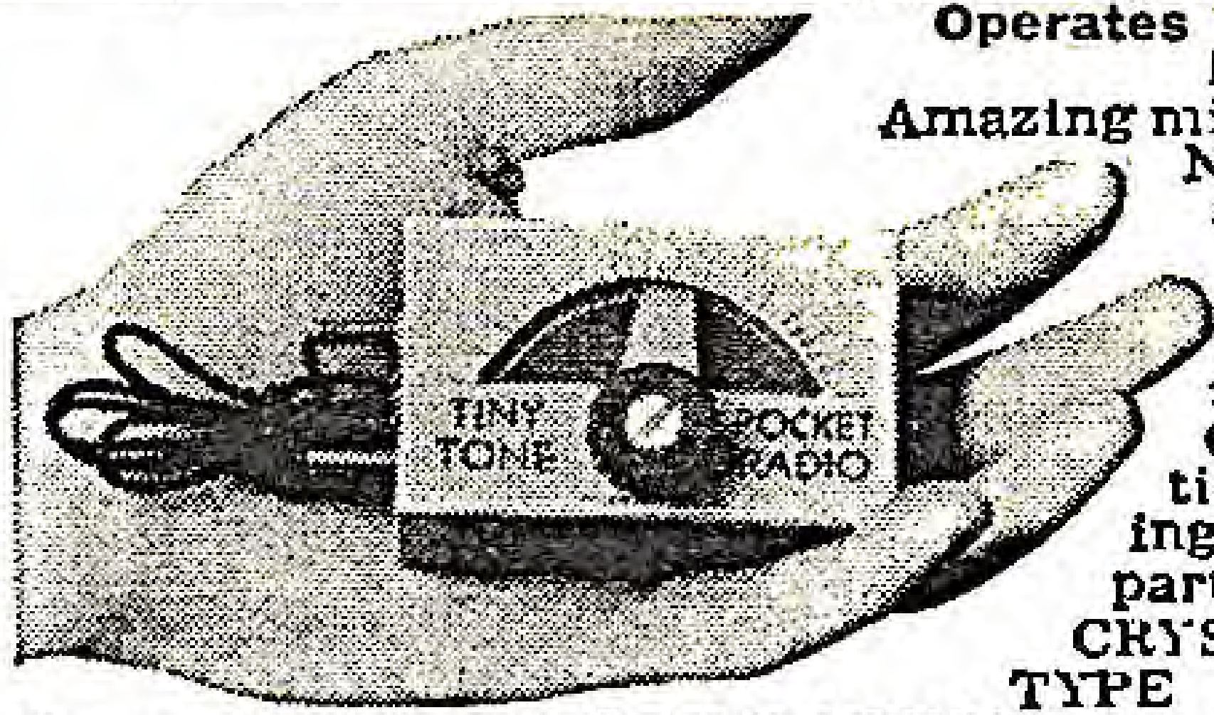

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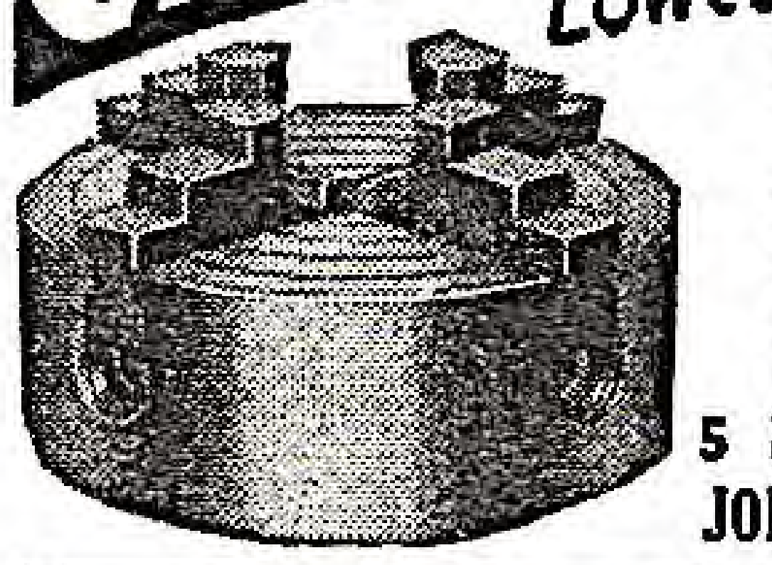

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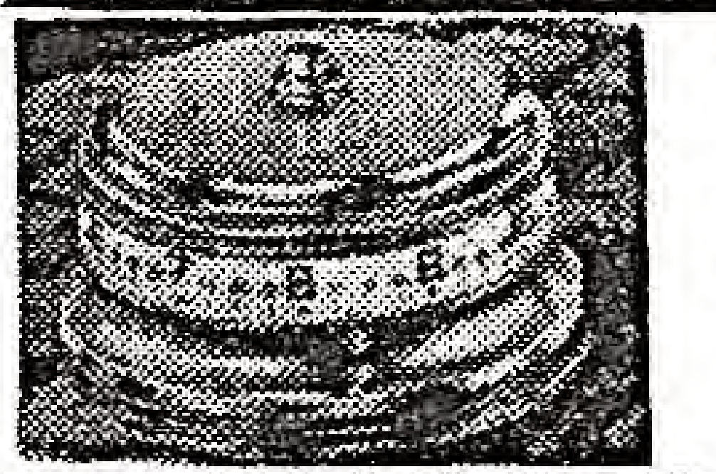

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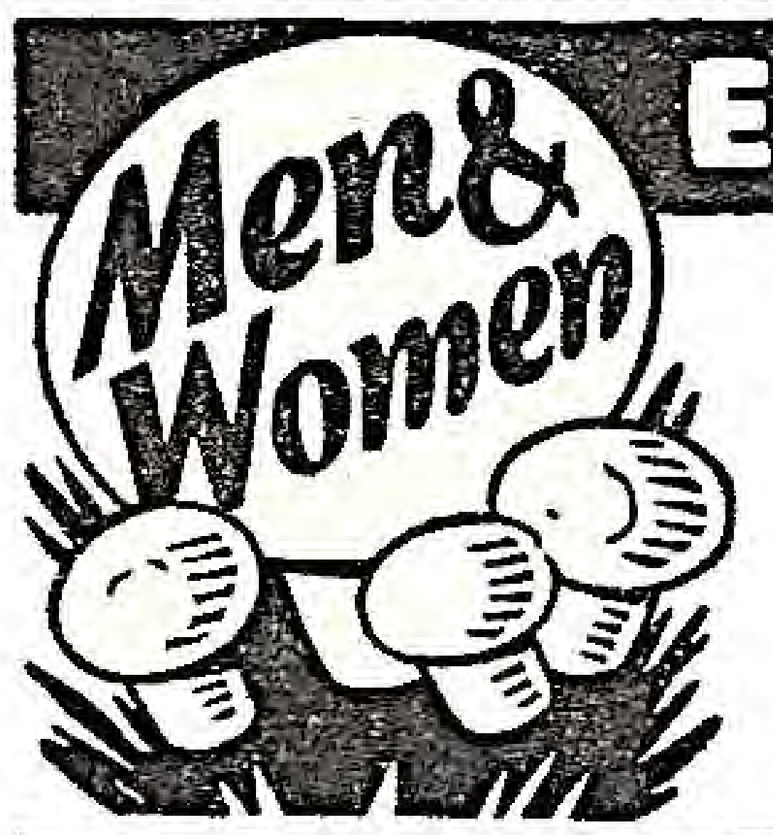

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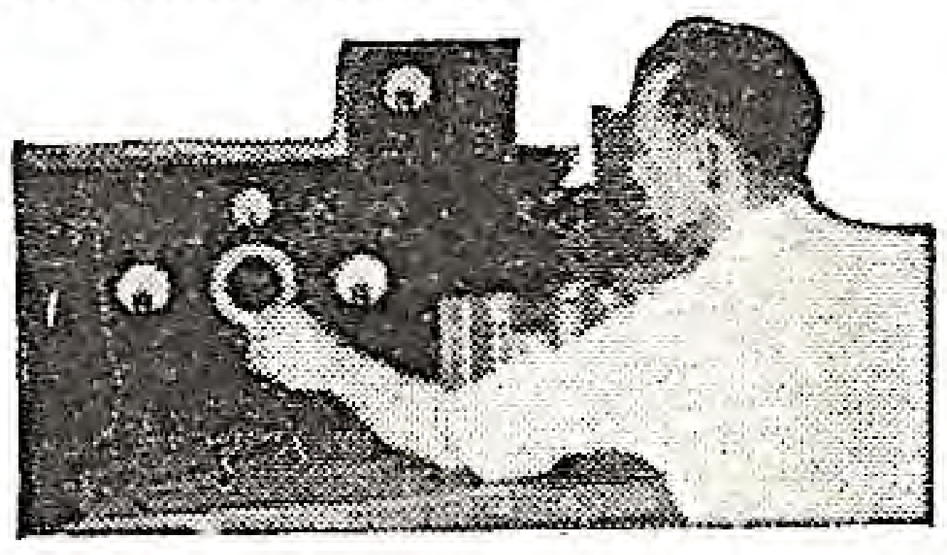

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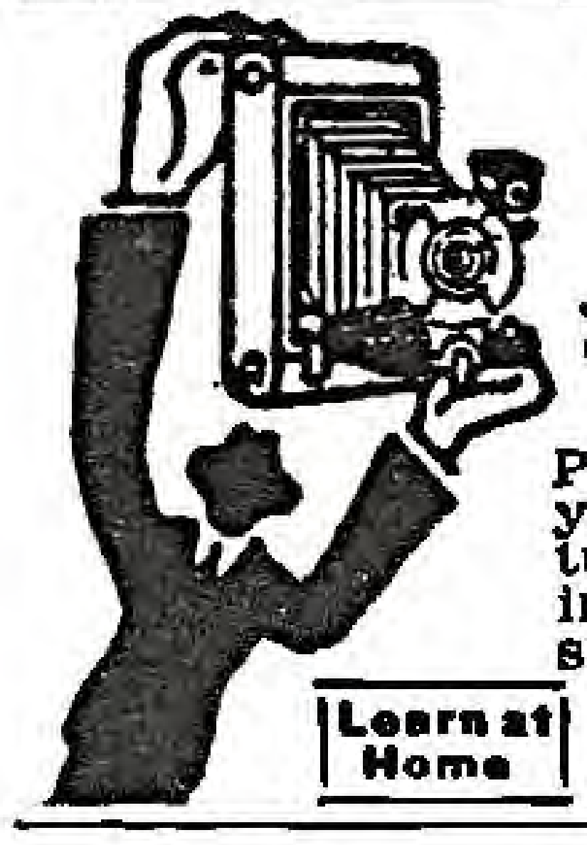

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J. Lawrence "Hippo" Teats, Elk City, Kan.

●

I made a perfect A.C. generator and D.C. motor. That book "Autopower" sure is great.
R. Lavigne, Bane, Vermont.

●

I changed a Dodge generator and it's O.K. I rent it for $15.00 per day.
C. A. Rief, Springfield, Mass.

●

Following "Autopower" Instructions, we have built several 60-cycle generators in my evening classes.
E. Gabar, Junior College of Electrical Engineering, Gary Public Schools, Gary, Ind.

●

"Autopower" is profusely illustrated with simple instructions and drawings. It is written in such a practical way anyone can understand it. 350 definitions of electrical terms, wire tables, etc. Indispensable to the beginner and invaluable to the experienced electrician.

BE A GENERATOR EXPERT

Start today in this new, fascinating business, turning scrap into money.
Create light and power for the farm, shop, and home.
Change auto generators into welders, wind chargers, A.C. and D.C. generators and motors with voltages from 2 to 1000 volts. Growler for testing armatures. Special instructions for welding, generators, and adapting larger machines for this use. This one feature alone is worth many times the price of the book.

FREE DIESEL BOOK

Diesel Guide

FOR A VERY LIMITED TIME

Every purchaser of "Autopower," will be given a free copy of "Diesel Guide," the recognized authority on Diesel engines. It covers everything from theory to actual work. Explains in a practical way the principles of every operation and part—theory, maintenance, installation, operation, trouble shooting, timing and valve setting. A wonderful opportunity to easily and quickly learn about Diesel motors. Both books written in simple terms—easy to understand.

MAIL THIS COUPON TODAY

AUTOPOWER, Inc.
Desk 3, 416 S. Hoyne Ave., Chicago, Ill.

Gentlemen:

I am enclosing $1.00 for a postpaid copy of "AUTOPOWER" and a FREE copy of "Diesel Guide."

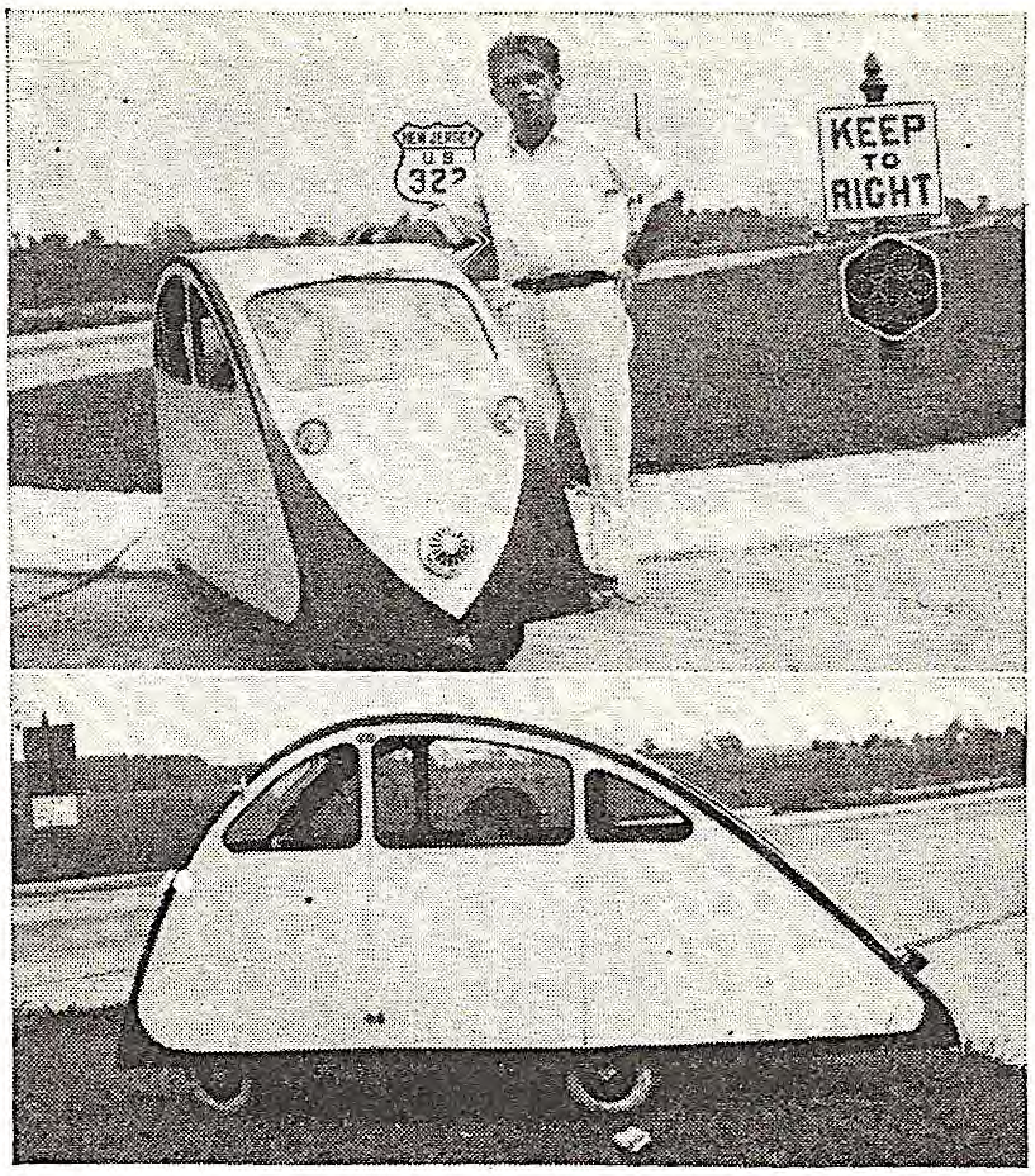
Name ....

Address ....

....

....

Random Chips from



Top—Bill Simmermon of Williamstown, N. J., and the novel midget auto he built. It is powered with a converted washing machine motor. Bottom—Side view of plywood covered body.

GOOD news for thousands of MM readers who live in the New England States! You can now tune in on the MM radio broadcast over the Yankee Network every Sunday between 12 and 12:30 P. M. Stations in the network are:

WNAC—Boston, Mass.
WTIC—Hartford, Conn.
WEAN—Providence, R. I.
WTAG—Worcester, Mass.
WICC—Bridgeport, Conn.
WCSH—Portland, Me.
WSAR—Fall River, Mass.
WNBH—New Bedford, Mass.
WLLH—Lowell, Mass.

Tune in on this program, readers, and help yourselves to a half hour of real enjoyment.

***

The increasing amount of mail and photographs that are finding their way to the Editor's Workbench supply ample proof that a workshop, no matter how small or how limited its equipment, still constitutes a lure that few red blooded men or boys can resist. Boats, model planes, midget racers and sleds seem to be the favorite projects at this time.

MM is pleased to note this increasing interest on the part of its readers and will endeavor to continue presenting workshop projects that will appeal to both experienced and inexperienced craftsmen. Send in your letters and photos relating to the hobbies enjoyed by you and your friends.

Atop the mailbag this month is a letter from Bill Simmermon, of Williamstown, N. J., in which he writes:

> Williamstown, N. J.
>
> Dear Editor:
>
> I am sending some photos of a little car I recently built from ideas obtained from MM combined with some of my own.
>
> The little car has been approved by the Motor Vehicle Department here. It is powered by a Briggs and Stratton washing machine motor, and does from 14 to 16 m.p.h. on good road.
>
> The body consists of three pieces of plywood, the doors, windows, and other openings being cut out after assembly. I will be glad to answer any questions your readers may care to ask with reference to my little car.
>
> Bill Simmermon.

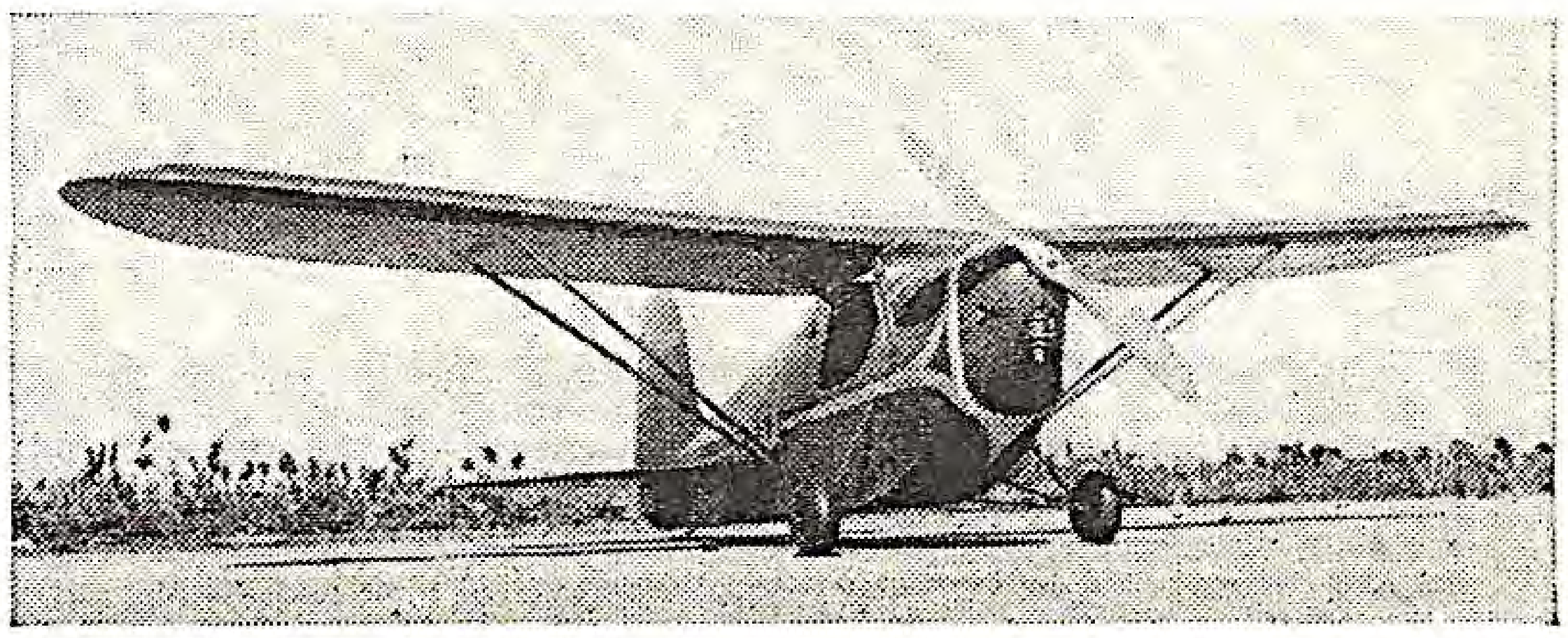
Mr. Simmermon's novel auto will probably appeal to many MM midget auto fans who will want to take advantage of his kind offer to supply details. Be sure and enclose a stamped, return envelope if you write to Simmermon.

The $5 award for this month's most interesting project photo goes to Mr. Simmermon, with awards of $3 each going to the senders of the remaining photos that appear in this month's Editor's Workbench.

***

Elbert J. Weathers, of San Diego, Calif., sends in a photo of a gas-powered airplane model that is one of the best we have seen. He was awarded $3 for his model photo and the description of it which appears in his letter:

> San Diego, Calif.
>
> Dear Editor:
>
> Enclosed is a photo of my new gas-powered model plane, known as "Tubby" locally. It is my own design and is powered with a tiny ELF engine which, because of its smallness, enables a correspondingly small gas model to be built.



"Tubby," a beautifully designed gasoline-powered model constructed by Elbert J. Weathers of San Diego, Calif. Using a 4-ounce motor, total weight of plane was held to 28 ounces.

the Editor's Workbench

My model has a wing span of 4 ft., 4 in., and weighs only 28 ounces ready to fly. It is my idea of how a large one-place light airplane should look. The model flies slow and makes three point landings.

I don't see how any home craftsman can afford to be without MM. The ideas and projects presented monthly are always new and ever appealing.

Elbert J. Weathers.

Gas models are becoming increasingly popular in the field of model aviation and we are pleased to see an MM reader contributing such a clean cut design to promote progress of the hobby.

***

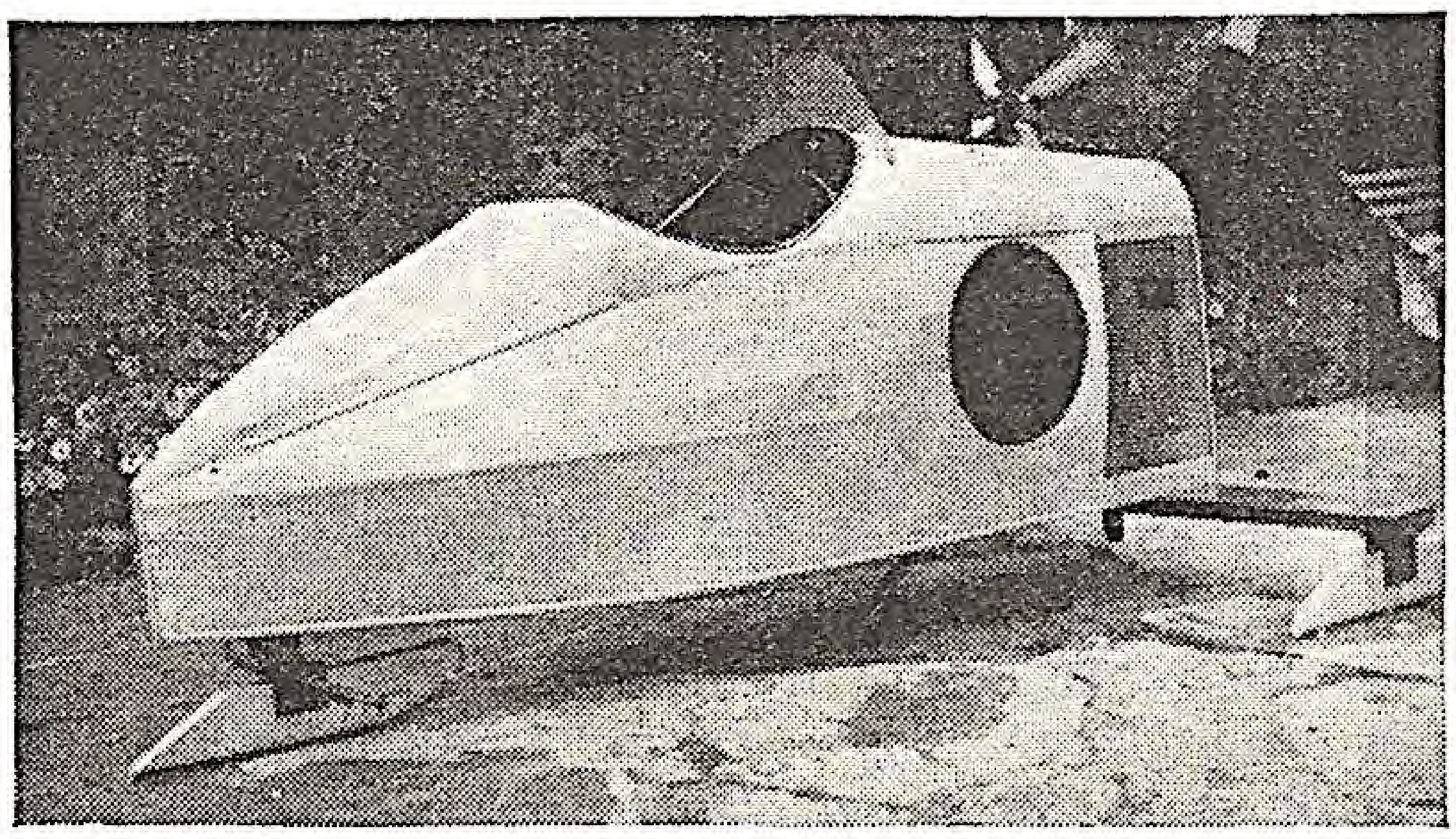
The Automatic Voting Machine Corp. calls our attention to an incorrect minimum price quotation on their machines in our November issue. This should have been $880 instead of $860. Most of the models cost more than this, the price being in proportion to the size of the election and primary ballots in the various states. These vary a great deal. While making corrections, Willard Proctor, editor of the *Grand Saline Sun,* asks us to explain that the salt-built Texas Centennial information booth illustrated last month is not in Dallas but in Grand Saline, Tex., where a lot of fine salt originates.

***

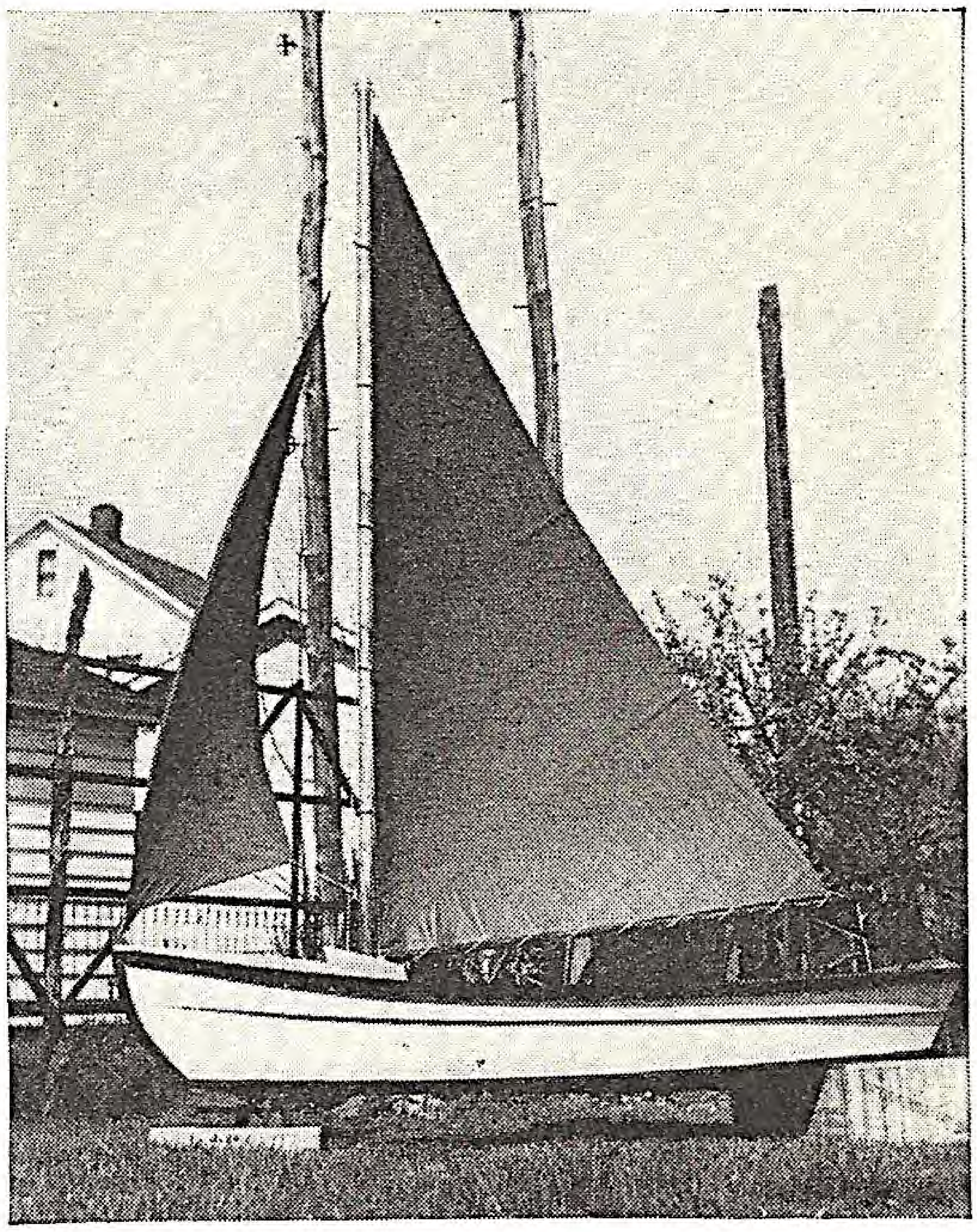
We mourn the death of Fred Hornby. A glimpse of a crane in action gave him the idea for making Meccano toys. He started in a one-room workshop in Liverpool in 1900. When he died Sept. 21 at the age of 73, the factory covered five acres and employed 1,500 persons and he was a former Member of Parliament.

***

With the approach of the winter sledding season we were expecting to receive some good photos of powered snow-sleds and a glance at the photo submitted by Charles K. Burval, of Des Plaines, Ill., proves that we were not disappointed. His letter says:



Picture yourself zipping over the snow at whirlwind speed in a powered sled like this one built by Charles K. Burval of Des Plaines, Ill. A Harley "61" engine and propeller power it.



Doesn't this trim sailing craft tempt you to start work on a boat for next season? Its the proud possession of George Zunner of Hartford, Conn., who built it from MM boat plans.

Des Plaines, Ill.

Dear Editor:

I am enclosing a snapshot of my Aero-drive sled which I wish to enter in your monthly workbench contest. It is 7 feet, 10 inches long and 4 feet between runners. The propeller is chain driven by a Harley "61" motor. I use a steering wheel for controlling the rear runner. All the controls are within reach of the operator of the sled. Hoping you can use the photo, I remain,

Charles K. Burval.

We can always use good clear photos of interesting projects and Mr. Burval was awarded $3 for his photo and description of the sled which is giving him much pleasure outdoors.

***

Boat building still attracts the majority of MM craftsmen and George Zunner, of Hartford, Conn., sends in a photo of a trim little craft. He says:

[*Continued on page* 26]

RAILWAY POSTAL CLERK
POSTOFFICE CLERK
GOVERNMENT CLERK

·U·S· Government JOBS

START
$1260 to $2100 YEAR
MEN—WOMEN
QUALIFY AT ONCE

Railway Postal Clerks get $1,900 the first year, on regular, being paid on the first and fifteenth of each month. ($79.17 each pay day.) Their pay is quickly increased to $2,450 a year ($204 a month).

TRAVEL FOR "UNCLE SAM"

3 Days On—3 Days Off—Full Pay

Railway Postal Clerks on long runs, usually work 3 days and have 3 days off duty or in the same proportion. During this off duty their pay continues just as though they were working. They travel on a pass when on business. When they grow old they are retired with a pension.

City Mail Carriers, Post Office Clerks

Clerks and carriers now get $1,700 the first year regular and automatically increase $100 a year to $2,100 and $2,300. They work but 40 hours a week and have paid vacations.

Customs Inspector

Salary $2,100 to start. Men 21 to 45. Work connected with examining merchandise entering the country from foreign parts.

Your Big Opportunity

Experience is usually unnecessary and political influence is not permitted. Let us show you how to get a government job.

Get Free List of Positions

Fill out the following coupon. Tear it off and mail it today—now, at once.

This investment may result in your getting a life big-paid government job.

FRANKLIN INSTITUTE, Dept. R260, Rochester, N. Y.

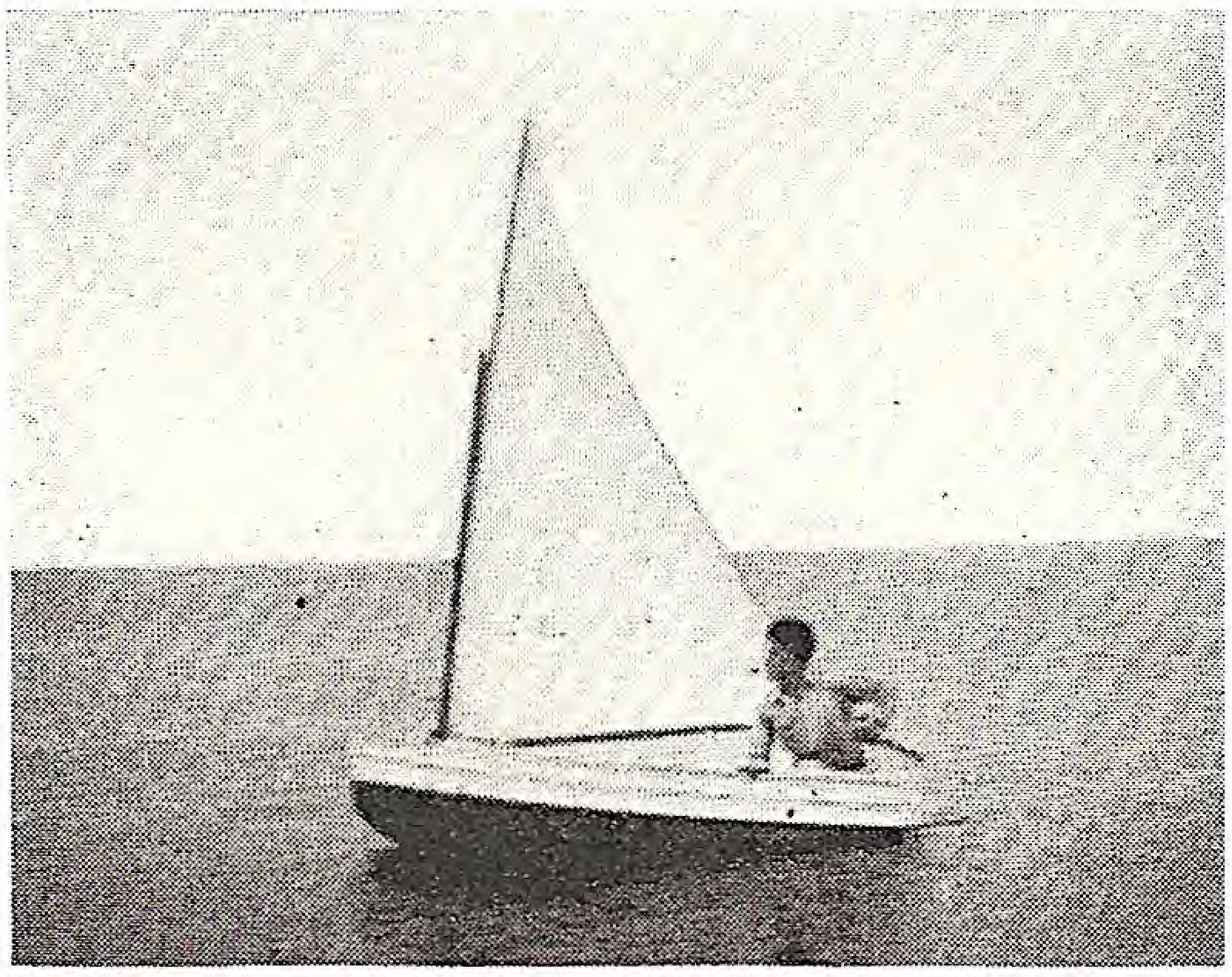
Gentlemen: Rush to me, FREE of charge, list of U. S. Government big pay jobs. Send me FREE 32-page book describing salaries, vacations, hours, work, and full particulars on how to get one of these jobs.

Name ....

Address ....

Chips from the Editor's Workbench

[*Continued from page* 25]



Leo Uibel of Vineland, N. J., testing his "Tar Baby" sailboat made from MM plans. Using wood from two table tops, Uibel was able to construct it at a cost of $15. It sailed well in tests.

Hartford, Conn.

Dear Editor:

Am enclosing a photo of "Jean," made from the MM boat book plans. With red Cape Cod sails she is the most outstanding boat on the lake. She has plenty of speed and points excellently. The entire outfit, including sails, cost me only $32.50 to build.

George Zunner.

When a neat little craft like Mr. Zunner's can be built for such an insignificant sum it is not hard to understand why home workshops throughout the country are burning the midnight oil at this time. Winter evenings are well utilized when spent constructing a boat for next summer's sailing weather.

***

Another photo of a snappy sailing craft made from MM boat plans is that sent in by Leo Uibel. It shows the "Tar Baby" sailboat constructed from plans in the MM "How To Build 20 Boats" book. Uibel says in his letter:

Vineland, N. J.

Dear Editor:

I enjoy every issue of MM. I'm enclosing photos of the boat I built from MM plans. It was my first attempt at boat building.

The "Tar Baby" handles easily, sails swell and is quite dry in medium waves. Only about $15 was spent in building the boat, including sails and oars. I hope to build "Buzzer," another MM boat, in the near future.

Leo Uibel.

Good work, Mr. Uibel, and judging from the workmanship evident in your "Tar Baby," we are sure you will encounter no trouble in constructing "Buzzer" when you undertake it.

We regret that we cannot publish all the fine photos that have been received, but wish to thank our many friends for sending them along.

To help you answer these 3 questions:

1- *What are today's opportunities in Drafting?*

2- *Will I like the work?*

3- *Can I learn Drafting readily?*

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Drafting welcomes ambitious men — offers good pay to start, with splendid opportunities for promotion. One of the *steadiest* of all lines. Right from the start, the beginner works side by side with experienced men—inking in their drawings, making tracings, constantly profiting by his contact with seasoned engineers. The "higher ups" see his work. If it is good, advancement is sure and steady.

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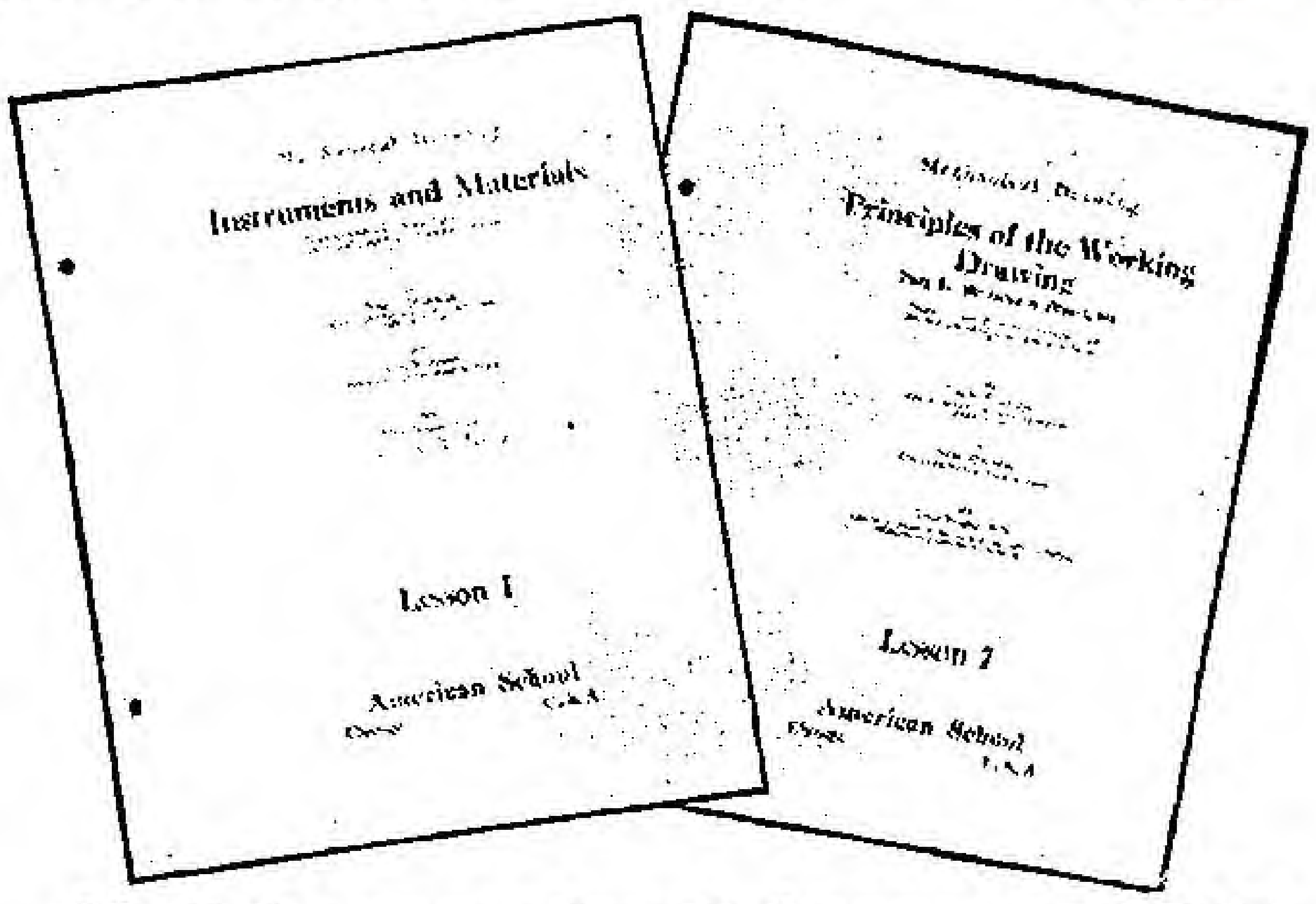
Prove That You Can Qualify

The 2 lessons will be sent absolutely without obligation. In the privacy of your own room, look them over. See how simply you start—how gradually you are led step by step—how thoroughly you master each point—how, as time goes on, you can pass from a raw beginning to complete *mastery* of Drafting—able to get and hold a pleasant, profitable, steady job. Such a future is well worth looking into RIGHT NOW, so . . . just mail the coupon!



Mail Coupon for 2 Lessons FREE

American School, Dept. DD-928
Drexel Ave. at 58th St., Chicago

Without the slightest obligation, send 2 beginning Drafting Lessons and free Bulletin. I am not to return them.

Name.................................*Age*.........

Address...

City.................................*State*.........

PLAY SAFE

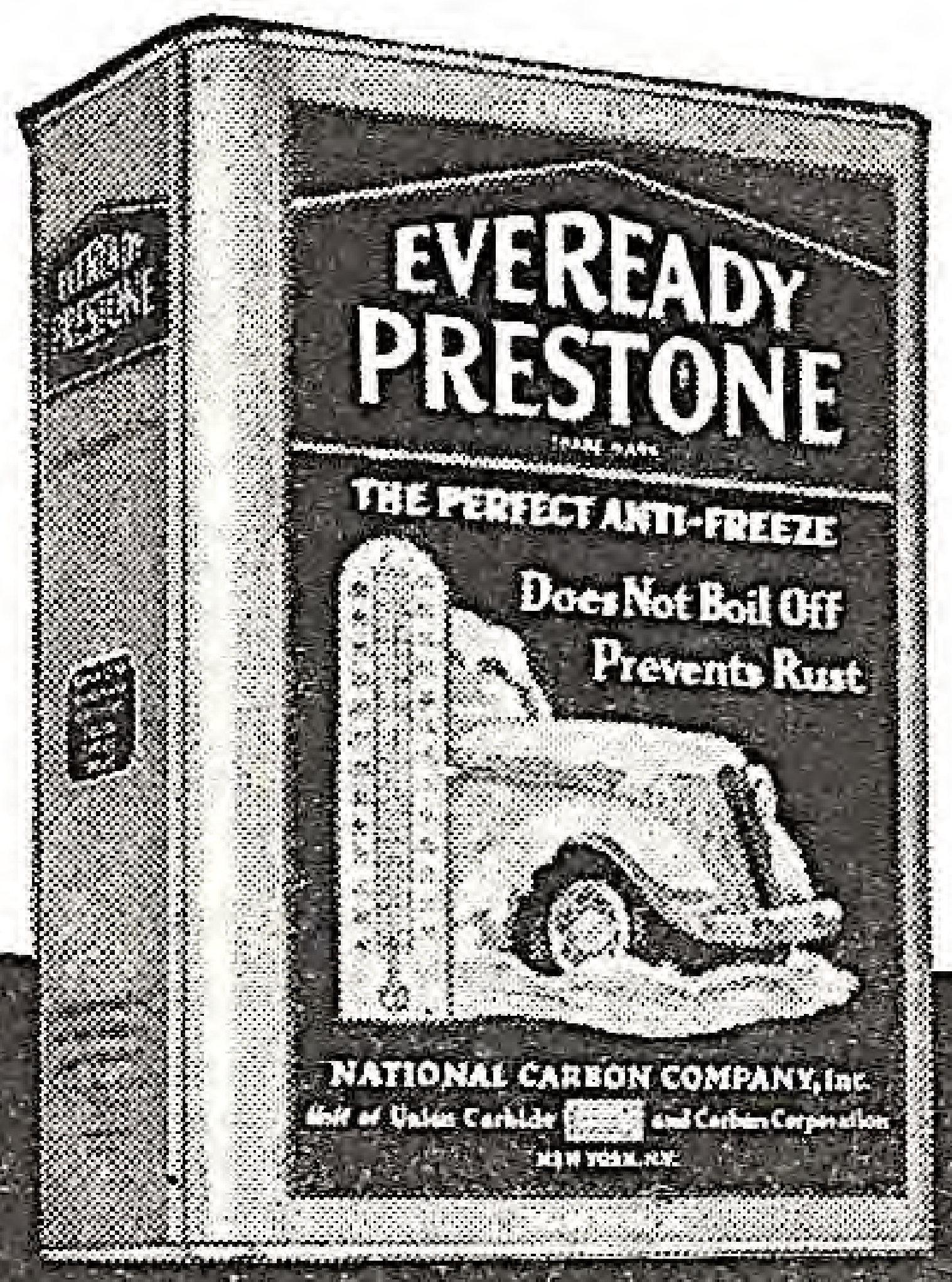
FIND YOUR CAR ON THIS CHART

IMPORTANT! The price per gallon of an anti-freeze means nothing unless you know *how many gallons* you will need during the *entire* winter. You can't get that information on a boil-away anti-freeze. But you *can* get it for "Eveready Prestone" anti-freeze . . . and here it is. See how reasonably you can get two-way protection *all winter long* against both freeze-up and rust with *one shot* of "Eveready Prestone" anti-freeze—one shot because it won't boil off, no matter how warm the weather gets between the cold snaps. If your car isn't on this chart, your dealer has a chart showing all cars; and amounts needed for temperatures to 60° below zero.

Find your car and read from left to right. The first figure shows the protection you get with one gallon of "Eveready Prestone" anti-freeze in the cooling system; the second with one and a half gallons—and so on. "+" means above zero. "—" means below zero. If your car has a hot water heater, add ¼ gallon to the quantity called for.

MODEL	1 GAL.	1½ GAL.	2 GAL.	2½ GAL.
Auburn				
6-52, '34; 6-53, '35; 6-54, '36	+12	− 4	−27	−59
8-100, '32; 8-101, 8-105, '33	+15	+ 2	−16	−42
850, '34; 851, '35; 852, '36	+17	+ 6	− 9	−28
Buick				
40, '34, '35, '36	+ 6	−18	−54	
60, '32; 50, '33, '34, '35	+10	− 8	−34	−62
60, 80, 90, '36	+12	− 4	−27	−59
80, 90, '32; 60, '33, '34, '35	+15	+ 2	−16	−42
80, 90, '33; 90, '34, '35	+19	+ 9	− 3	−19
Cadillac				
370-D, '34, '35	+14	0	−21	−50
355-D, '34, '35; 80, 85, '36	+16	+ 4	−12	−34
452-D, '34, '35; 90, '36	+19	+ 9	− 3	−19
370-A, '31; 355-B, '32; 355-C, '33	+21	+13	+ 3	− 9
60, 70, 75, '36	+22	+15	+ 8	0
Chevrolet				
Stand.; '33, '34, '35	−12	−62		
Master; '33, '34, '35	− 6	−47		
'31, '32	0	−34	−62	
All Models—'36	+ 8	−12	−43	
Chrysler				
6-'32, '33, '34, '35	+12	− 4	−27	−59
8-'31, '32; AF, Imp. '35; 6-'36	+15	+ 2	−16	−42
Roy. 8, Imp. 8, '33; Air 8, '35	+16	+ 4	−12	−34
70, '31; DeLuxe 8, '36	+18	+ 8	− 6	−23
De Soto				
6, '31, '32, '33; 8, '31	+10	− 8	−34	−62
6, '34; Airflow 6, Airstream 6, '36	+16	+ 4	−12	−34
Airflow, Airstream, '35	+12	− 4	−27	−59
Dodge				
6, '32, '33, '34, D2, '36	+ 8	−12	−43	
Senior 6, '30; DU, '35	+12	− 4	−27	−59
8-'32, '33	+15	+ 2	−16	−42
Ford				
A, '30, '31; B, '32, '33	0	−34	−62	
V-8, '32, '33, '34, '36	+18	+ 8	− 6	−23
V-8, '35	+16	+ 4	−12	−34
Graham				
80, 90, 110, '36	+10	− 8	−34	−62
73-Spl. 6; 72-8, '35	+14	0	−21	−50
74-6, '35; 80, '36	0	−34	−62	
6, 8, '33; 6, 8, '34; 75, '35	+16	+ 4	−12	−34
Hudson				
6, '36	+ 3	−25	−62	
8, '31, '32, '33; 6, '35	+12	− 4	−27	−59
8, '35, '36	+17	+ 6	− 9	−28
8, '34	+19	+ 9	− 3	−19
Hupmobile				
18, '31; Cent. 8, '32; 321, '33	+10	− 8	−34	−62
417, 421, '34; 521, '35	+10	− 8	−34	−62
322, '33; 422, '34; 518, '35;	+17	+ 6	− 9	−28
6-618-G '36	+17	+ 6	− 9	−28
326, '33; 426, '34; 527, '35;	+19	+10	0	−15
8-621-N '36	+19	+10	0	−15
Lafayette				
'34; '35; '36	+15	+ 2	−16	−42
La Salle				
50 (Str. 8) '36	+10	− 8	−34	−62
350, '34; 35-50, '35	+15	+ 2	−16	−42
345-B, '32; 345-C, '33	+21	+13	+ 3	− 9
Lincoln				
Zephyr, '36	+21	+13	+ 4	− 7
136,'33,'34,'35,'36;145,'34,'35,'36	+23	+17	+10	− 2
Nash				
60, 70, '31; 960, 970, '32	+ 3	−25	−62	
1130, 1070, 1170, '33; 1220, '34	+12	− 4	−27	−59
3620, 3640, 3640A, '36	+14	0	−21	−50
1280, '34; 3580, '35; 1080, 1180, '33	+17	+ 6	− 9	−28
Oldsmobile				
F-30, '30; F-31, '31; F-35, '35;	+ 3	−25	−62	
F-36, '36	+ 3	−25	−62	
F-32, L-32, '32; F-33, '33;	+12	− 4	−27	−59
L-35, '35; L-36, '36	+12	− 4	−27	−59
L-33, '33; L-34, '34	+15	+ 2	−16	−42
Packard				
120-'35, '36	+14	0	−21	−50
Sup. 8, '33; '34; 8, '33, '34, '35	+16	+ 4	−12	−34
Sup. 8, '35	+18	+ 8	− 6	−23
745, '30; 845, '31; DeLuxe, '32	+21	+13	+ 3	− 9
12, '33, '34, '35, '36	+25	+21	+10	+ 3
Pierce Arrow				
41, 42, 43, '31; 54, '32; 836-A, '34	+21	+13	+ 3	− 9
1601-8, '36	+21	+13	+ 3	− 9
840-A, '34; 845, '35	+22	+15	+ 6	− 5
1602-03 (12), '36	+24	+20	+15	+ 9
Plymouth				
'30; PF. PG. '34	+ 6	−18	−54	
PA, '31; PB, '32; PE, '34; PJ, '35;	+10	− 8	−34	−62
P1, P2, '36	+10	− 8	−34	−62
PC, PD, '33	+ 3	−25	−62	
Pontiac				
'30; '31; 6-'32; '35	+ 6	−18	−54	
8-'33, '34, '35; 6-'36	+ 8	−12	−43	
8-'36	+12	− 4	−27	−59
Reo				
6-21, 6-25, '32; FC '35; Roy. '35;	+15	+ 2	−16	−42
6D, '36	+15	+ 2	−16	−42
8-25, '32; S-2, '33; S-6, '34	+16	+ 4	−12	−34
Studebaker				
Dict. 6, '36	+ 6	−18	−54	
Comm. 8, '31, '32, '33;	+10	− 8	−34	−62
Dict. 6, '34, '35	+10	− 8	−34	−62
Dict. '31, Comm. 8, '34,	+14	0	−21	−50
Pres. 8, '33, '34, '36	+14	0	−21	−50
Pres. 8, '31, '32, '35; Comm. 8, '35	+17	+ 6	− 9	−28
Terraplane				
6, '32, '33; 6 Spec. '35; 6, '36	+ 3	−25	−62	
8, '33; 6 DeLuxe, '35	+10	− 8	−34	−62
6, '34	+14	0	−21	−50

$2.70 A GALLON



CONTAINS NO ALCOHOL

and SAVE

with "EVEREADY PRESTONE"

ANTI-FREEZE

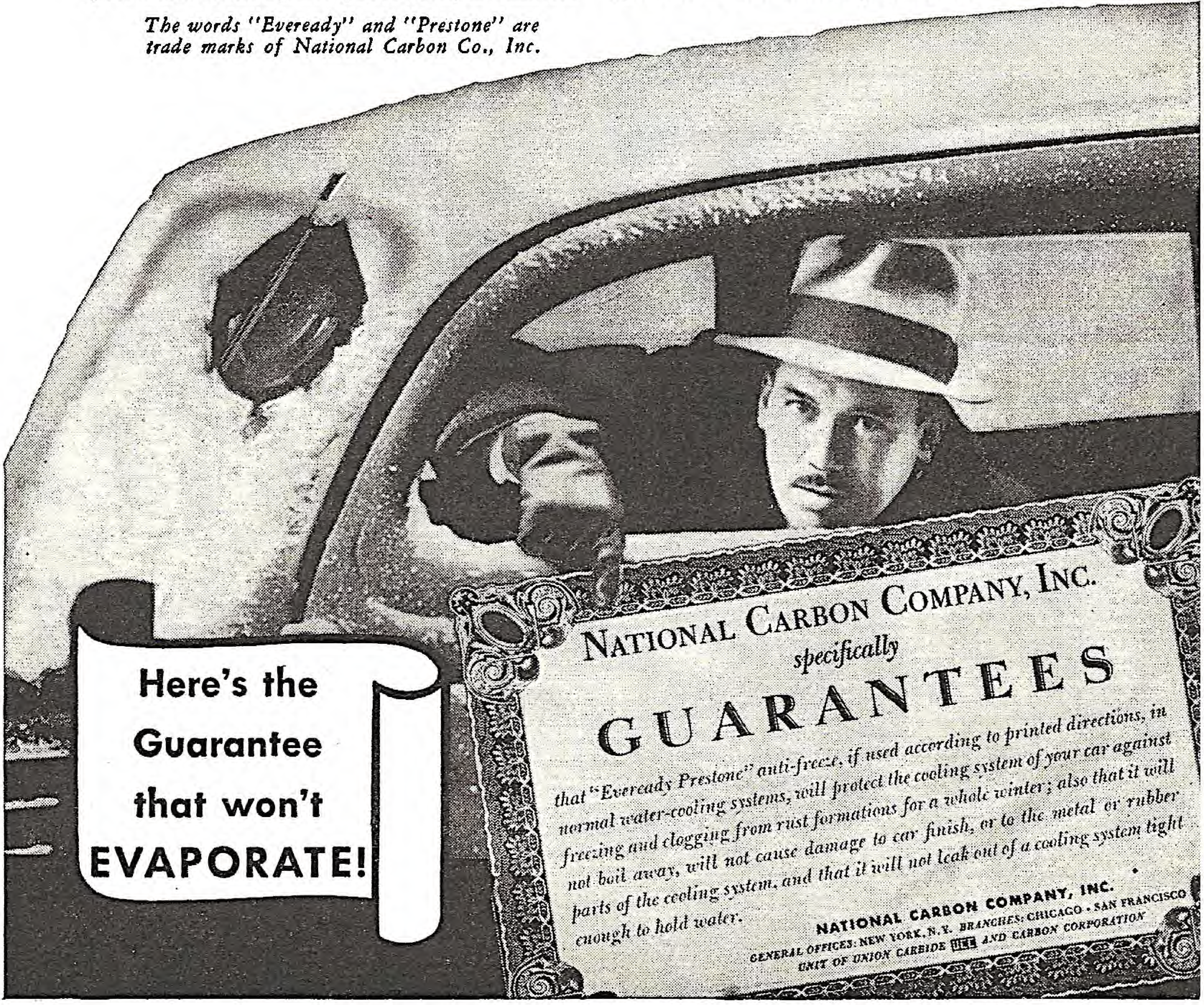
Start the winter *right,* with "Eveready Prestone" anti-freeze in your car, and you finish the same way. Save yourself from freeze-ups, rust clogging, the perils of overheating and from worry.

And don't be confused by a name. There are nearly 50 brands of anti-freeze on the market, based on alcohol but each with a different name. And alcohol will boil off, leave you without adequate protection, no matter how it is treated or what it is called. *"Eveready Prestone" anti-freeze contains no alcohol.*

• • •

Put in one shot of *guaranteed* "Eveready Prestone" anti-freeze today and your cold-weather troubles are over for the whole winter. Look up your car now on the chart at the left and see how little you have to pay for guaranteed all-winter protection.

The words "Eveready" and "Prestone" are trade marks of National Carbon Co., Inc.



Here's the Guarantee that won't EVAPORATE!

NATIONAL CARBON COMPANY, INC.
specifically
GUARANTEES

that "Eveready Prestone" anti-freeze, if used according to printed directions, in normal water-cooling systems, will protect the cooling system of your car against freezing and clogging from rust formations for a whole winter; also that it will not boil away, will not cause damage to car finish, or to the metal or rubber parts of the cooling system, and that it will not leak out of a cooling system tight enough to hold water.

NATIONAL CARBON COMPANY, INC.
GENERAL OFFICES: NEW YORK, N.Y. BRANCHES: CHICAGO • SAN FRANCISCO
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A WOMAN PROPOSES!

WHEN a woman proposes it's worth listening! And many a man is forging ahead today, earning more money and heading toward a brighter future, because a woman proposed that he acquire more training in his spare time. Such men are following in the footsteps of business leaders who attribute their success to mastery of I. C. S. courses. Spare time is an opportunity! This coupon is an opportunity!

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Without obligation, please send full particulars about the subject before which I have marked X:

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☐ Patternmaker
☐ Foundry Practice
☐ Sheet Metal Worker
☐ Boilermaker
☐ Heat Treatment of Metals
☐ Management of Inventions
☐ Diesel Engines
☐ Aviation Eng. ☐ Auto Mechanic
☐ Plumbing ☐ Heating
☐ Air Conditioning ☐ Refrigeration
☐ Steam Engineer
☐ Steam Electric Engineer
☐ Marine Engineer
☐ Civil Engineer ☐ Highway Engineer
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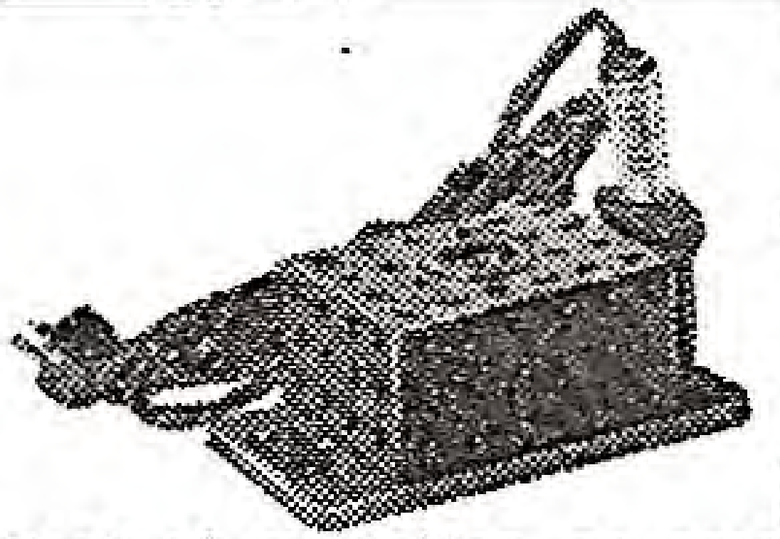

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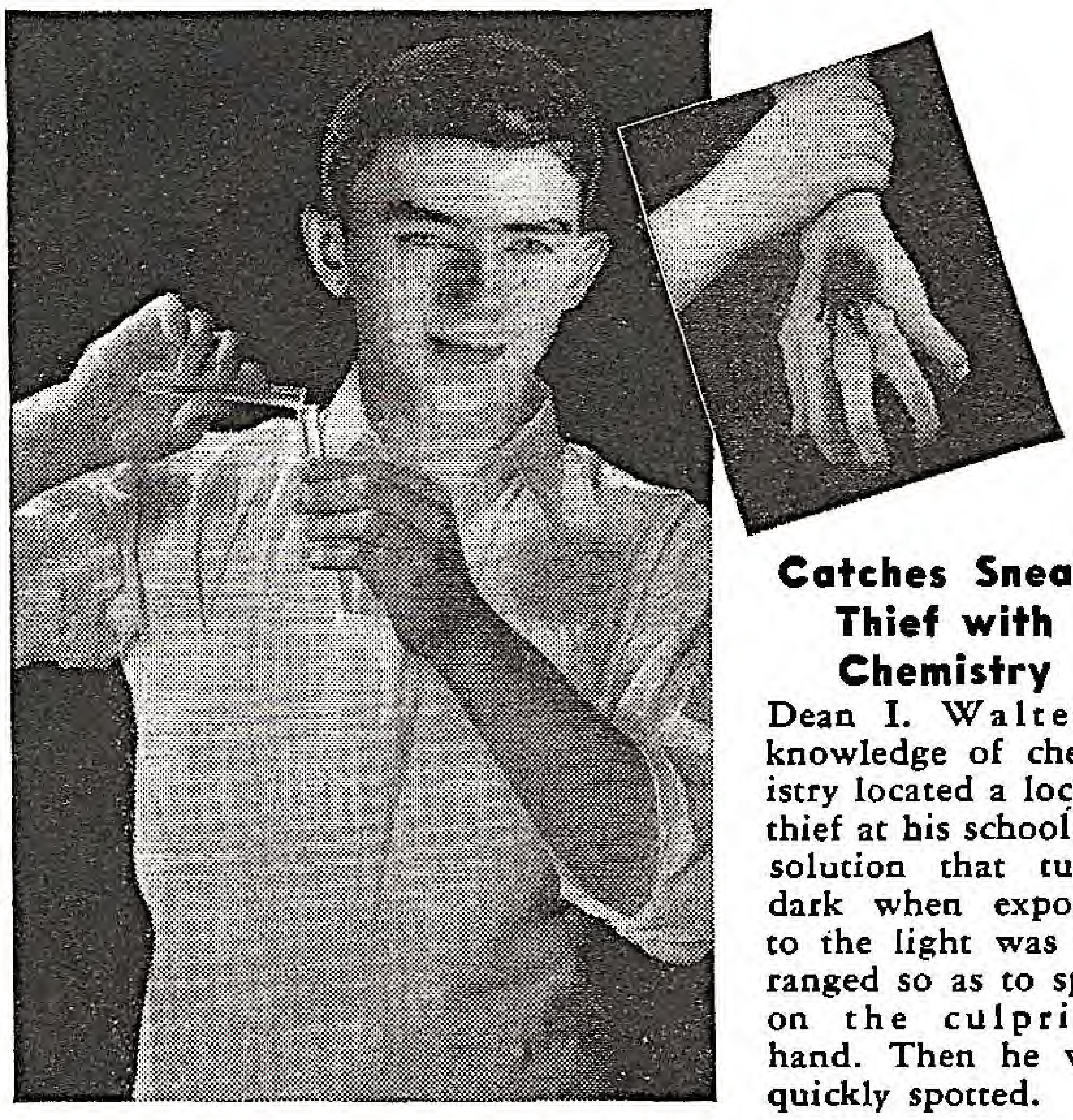

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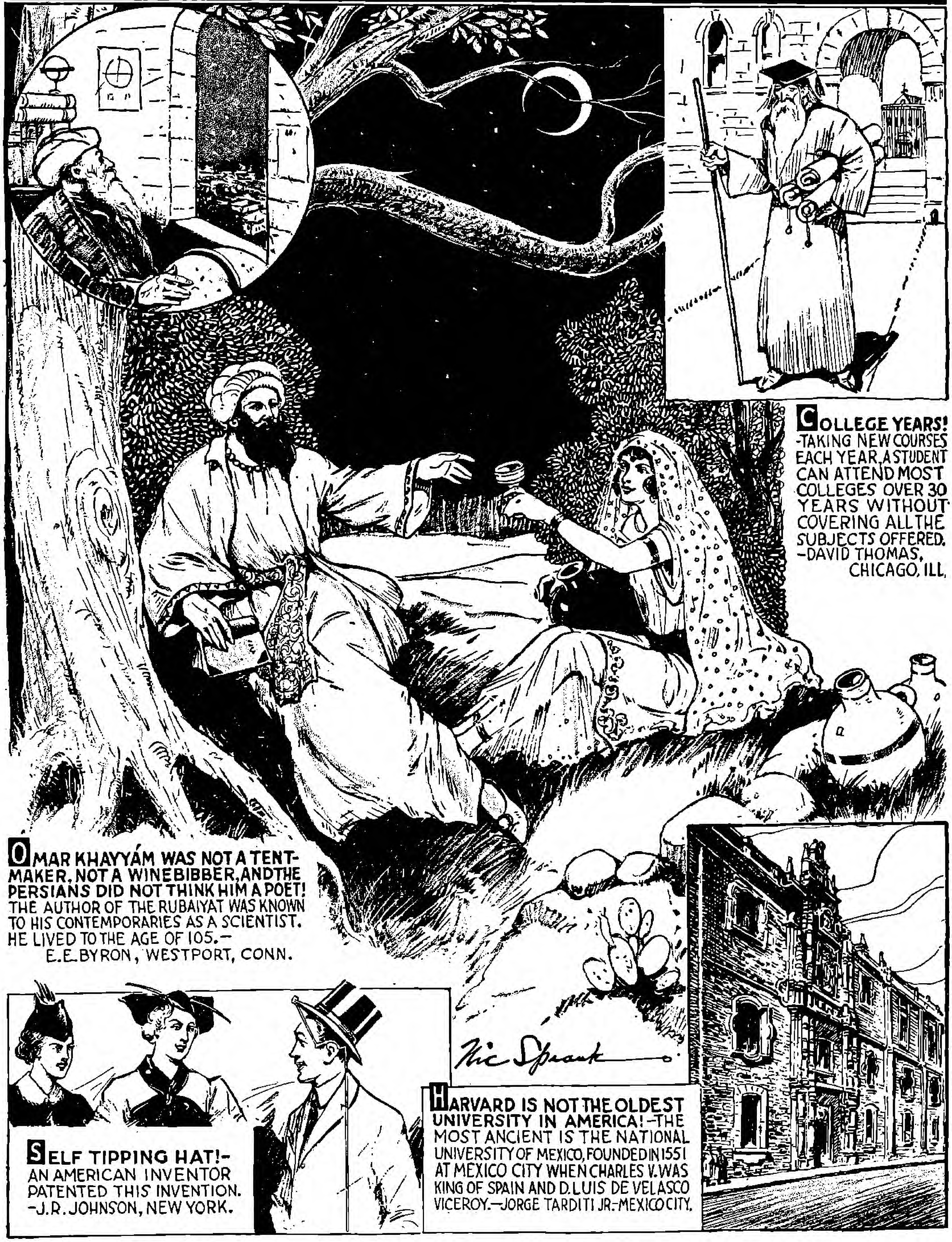

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DELIVERING *the* GOODS

A Guest Editorial

—Dooner Photo

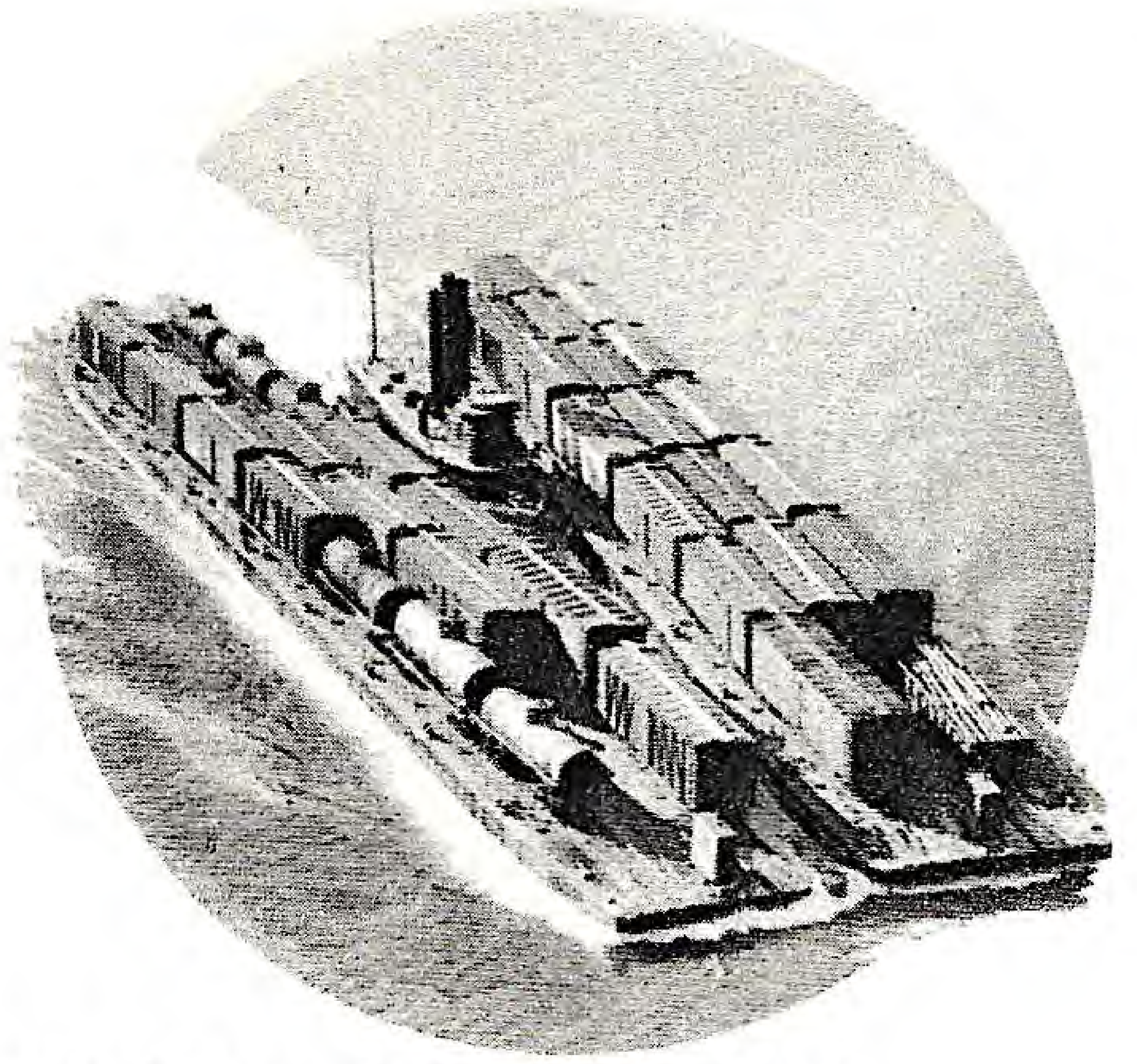
R. P. Page, Jr

ANYONE who wants to exercise his imagination can find a rich topic in this: What would be man's state today if all transportation were abolished? We take for granted the railroads, the ships, the trucks, the planes, and the passenger cars which speed over the roads and waterways of the world; but sometimes those things we take for granted deserve a little analytical thought.

Remove from man his means of transporting goods to other men, and we should have a barbaric and primitive world. Manufacturing would become as impossible as the interchange of ideas; and it is by such interchange that man progresses.

One of the greatest contributing factors to the development of transportation has been the inventive genius of those to whom transportation is both vocation and avocation. Indeed, this double appeal of transportation is characteristic of few other subjects. Children play with toy trucks and cars; and one may fairly suspect that even in the adult's passion for trains and airplanes there is something of the child's thrill and excitement.

Transportation has never changed more radically than in the past 25 years, and it is still in the process of change and advance. It is an inexhaustible field, offering endless satisfaction and rewards to those engaged in it. Motor trucks have shown their greatest development and improvement in the last six or eight years. The depression has accelerated, not retarded, that trend. The modern day requires speed, safety and economy in transportation of goods, and tomorrow is going to demand even more speed and even greater economies, at no sacrifice of safety. The clever individual who can provide the answer to those demands will find no cause to quarrel with his rewards.



R. P. Page, Jr.

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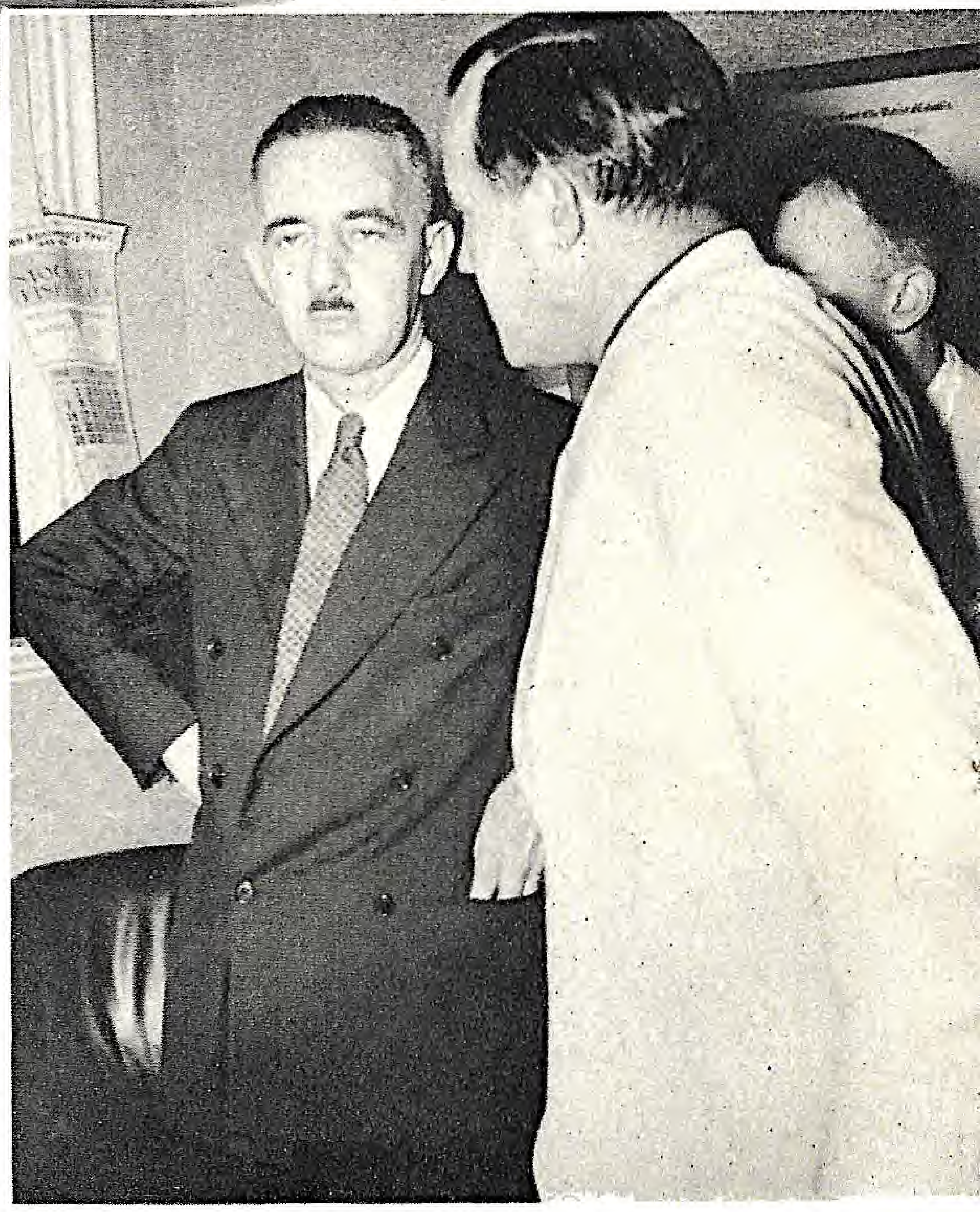
The Autocar Company

TRAPPING

The *Idaho* and *Texas*, shown here, and all other U. S. warships have been closely guarded since the arrest last summer of two former Navy men on espionage charges.



John S. Farnsworth, a former lieutenant commander, shown as he was arraigned in Washington on charges of furnishing U. S. Navy secrets to Japan. He pleaded not guilty.

"A SPY simply *must* communicate with his master," the foremost American hunter of spies told me. Then he added, fervently: "Thank God!"

For the very act of sending his precious stolen information to the country he serves, places the war time spy in deadly danger. The "spy wireless" by which he sends it, is his strength only if it be safely hidden; once discovered, it is his weakness, betraying him to death at dawn before a firing squad. Through that fatal weakness, American spy hunters recently have detected an astounding number of spies for foreign countries, here among us, stealing our defense secrets.

Late this summer, the famous G-men of the Department of Justice startled a nation that usually thinks spies a good joke, by announcing that prowlers from overseas were so

ENEMY SPIES

by THOMAS M. JOHNSON

Author of "Our Secret War" and "Without Censor"

active they must be rounded up. Other government departments are taking precautions unprecedented in peace time. Nevertheless, Navy safes and confidential papers have been tampered with by eavesdroppers seeking information about our new billion dollar defense program, and they have stolen so much valuable information that Admiral W. H. Standley admits the Navy may change its fleet tactics.

It is not sensational but true that today there is more spying the world over, including our unsuspecting country, than in any period of so-called peace in history. In Europe alone spies great and small number hundreds of thousands, and the number arrested has trebled this past year. The world is preparing for war, arming; its powers sizing one another up, trying to steal war plans and inventions such as Yankee ingenuity has produced in such numbers. Foreign agents haunt Washington, seeking patent papers. But there is more.

For selling secrets to Japan, a former American navy petty officer was sentenced recently, to 15 years imprisonment, and a former lieutenant commander awaits trial as this is written. There have been other recent amazing spy cases. In each, has appeared the "spy wireless," unknown to science, yet sometimes, scientific, whereby the spy smuggles the papers containing vital information purloined from a government office, a battleship, even a locked safe, to the master spy who is not infrequently an official of a madly ambitious foreign power. Actually, "spy wireless" may be a hidden radio, an encoded telegram or a letter in secret ink, a carrier pigeon, a double-bottomed trunk, a book binding, the hollow barrel of a key—anything to conceal a tiny roll of tissue paper with its microscopic writing. In international secret service, the art of safe communication has been refined into a fascinating black art.

Arrested last July was Lieutenant Commander John S. Farnsworth, called "Dodo" at

William F. Friedman, at left, former U. S. Army major, is one of the world's greatest solvers of spy codes and ciphers. Climax of a World War spy drama is pictured just above. Carl Hans Lody, the great German spy, salutes as a British court-martial condemns him to be shot in the Tower of London. A statue in his honor was unveiled in Lubeck, Germany; a bell above it is tolled every Nov. 6, anniversary of his death. Lody once lived in Omaha, Neb.

Mata Hari, at left, was the most glamorous of World War secret agents. An attractive dancer, she beguiled the highest officers until trapped and shot by the French. Her adventures have been the theme of books and motion pictures.

Spy-hunting American officers are pictured below in the special chemical laboratory of the Base Censor at Paris testing for secret ink a suspicious letter in the A. E. F. mail.

Annapolis, where he was graduated with honors. In naval aviation he went high, but crashed; his family says the accident left him "queer." Soon afterward, in 1927, he was dishonorably discharged from the navy. Needing money, he was charged with selling out as a spy to the Japanese, who in four years were alleged to have paid him $23,000, and using friendships with navy officers and wives to gather and give the Japanese "inside stuff" heard over bar and bridge table or, sometimes, lifted from desk drawers. Once it is said he boarded a destroyer, pretended to be a commander, and tricked an awed ensign into lending him maneuver data which he hurriedly photostated, then returned. But a new Japanese attaché cut his pay. Desperate, Farnsworth is said to have offered his confessions to an American newspaper for $20,000, and a 72-hour start for Europe aboard the Zeppelin Hindenburg. But Farnsworth confessed none of this; only to newspaper men he said that he sold the Japanese two "harmless monographs" for $1,000.

The "thirty pieces of silver" for which Harry T. Thompson betrayed his country, were $700. Yet his stealthy attack weakened the great United States Fleet, riding majestically at anchor in the Pacific, guns pointed toward the rising sun. A former navy yeoman, Thompson donned his old uniform, visited naval vessels, asked questions and brought back papers describing Pacific Fleet training. He camouflaged these as harmless brown-paper packages and delivered them to his master, also a Japanese naval officer. Their correspondence, also camouflaged, was read in court. But a letter can be opened, without leaving a trace, by slipping beneath the envelope flap, a stick with a slot in which the letter is caught and drawn out by gently winding the stick, read, and returned. On July 3 Thompson was convicted. In Los Angeles jail, common felons scorned the traitor spy.

Harry Thomas Thompson, left, a former Navy yeoman was convicted last summer, of espionage. Innocent persons are often arrested by spy-fearing authorities. Miss Isobel Lillian Steele, right, an American violinist, was freed after four months in a German prison camp.

In nearby San Pedro, two weeks later, came a visitor to the U. S. S. *Saratoga*. Aircraft carrier secrets are closely guarded since a foreign power obtained movies of one of them. When the stranger began asking questions and taking hurried notes, a dozen gobs sprang upon him.

"Why, these notes are in code!" they cried, angrily.

The code-writer went behind bars; final disposition of his case is shrouded in mystery.

So is the whole necromancy of codes and ciphers, the side of secret service that to the average reader, seems most occult of all. He

This Japanese girl, Janet Ono, was a stammering and reluctant witness against Harry Thomas Thompson at his trial, in Los Angeles. Prosecutors contended that he used her as a means of contact with a Japanese consular attache.

little dreams that in these days of "peace," just as in war, the hidden struggle goes on between spy and spy-hunter, between code-writer, or cryptographer, and code-reader, or cryptanalyst.

The spy hunter may tap his suspect's telephone, watch his mail and telegrams (which is almost universal in many foreign countries) —but that is only a beginning. You must watch everything—even his laundry! How can a dirty shirt hide a secret message? Well, suppose the shirt has 26 pleats, and spots scattered over the pleats—yes, in a pattern spelling words. Ridiculous? It's been done! And once you know the spy's laundry is his post office, the laundryman a confederate, then through that laundry you may send falsified reports to the master spy behind the scenes, and perhaps ultimately, unravel a whole spy network . . . thanks to spy wireless.

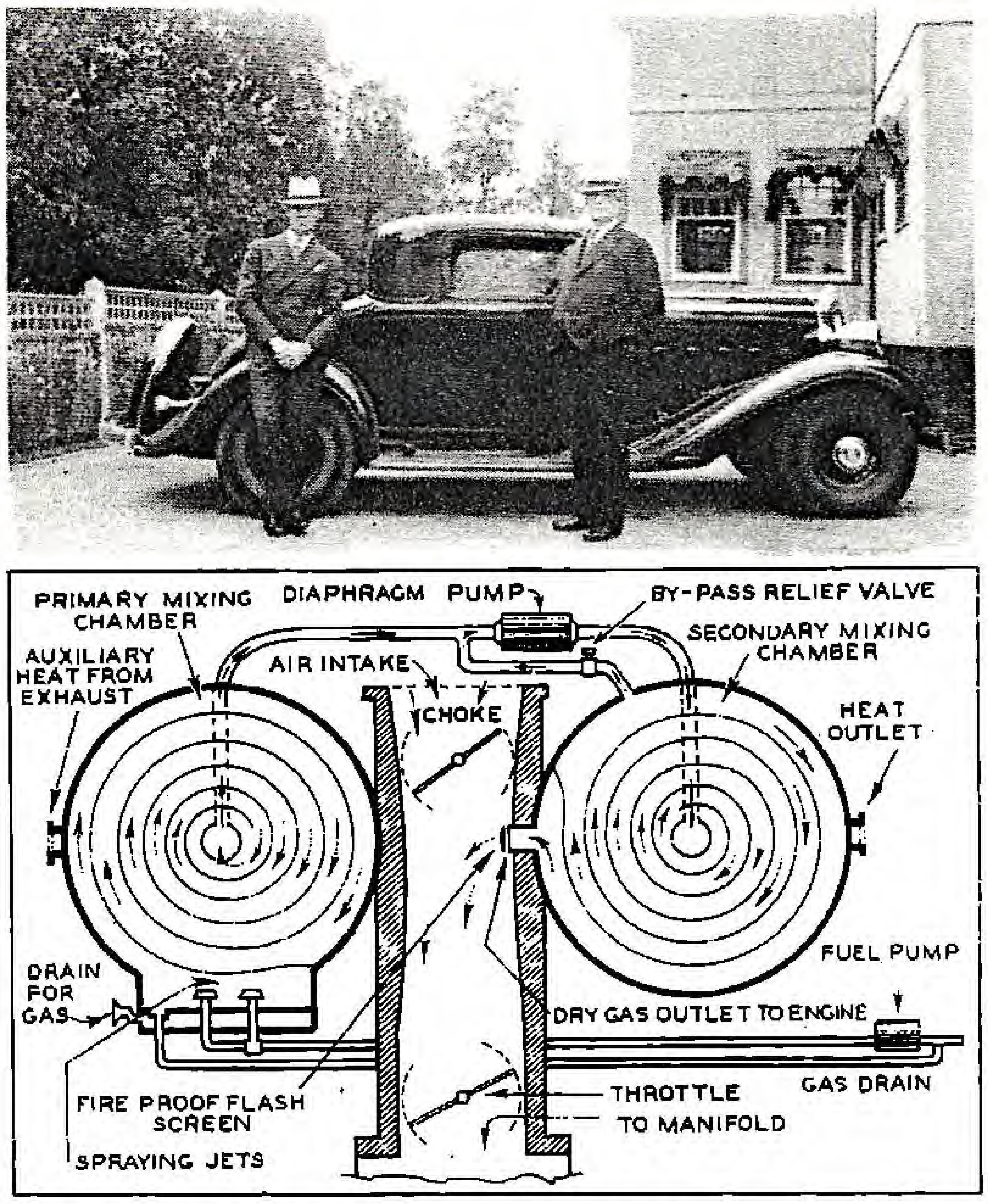
In Washington, in an inconspicuous wing of an unimpressive building, is a remarkable

[*Continued on page* 140]

Double-Mixing Carburetor Increases Power And Mileage

A NEW carburetor that makes mileage of 200 miles per gallon a possibility has been invented by a Winnipeg, Can., engineer. It has been tested and examined by several automotive engineers who claim it is entirely feasible in its action.

C. N. Pogue, the inventor, supplies his carburetor with two mixing chambers instead of one. The gasoline is vaporized in the primary chamber and before being used is sent through another mixing chamber. Here, since it is vapor that burns and not liquid gasoline, the gasoline is further vaporized into a still finer mixture. This insures more power and mileage from usual quantity of liquid gasoline.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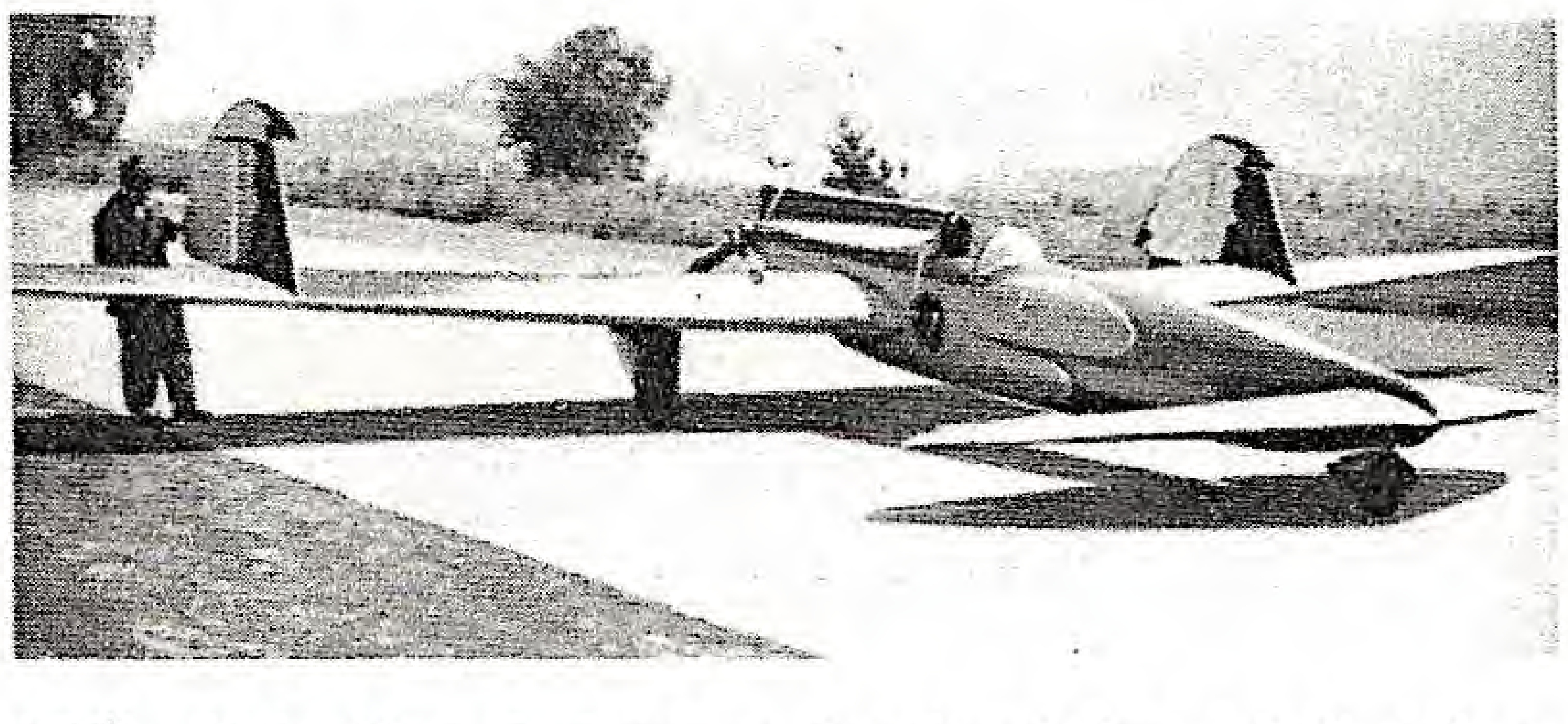
THROTTLE
TO MANIFOLD
FIRE PROOF FLASH SCREEN
SPRAYING JETS

Top—C. N. Pogue and W. J. Holmes who developed Pogue carburetor. Below—Showing how gasoline is double-mixed before use. Mileage of 200 miles per gallon is a possibility.

Midget Plane Has "Tail" In Front

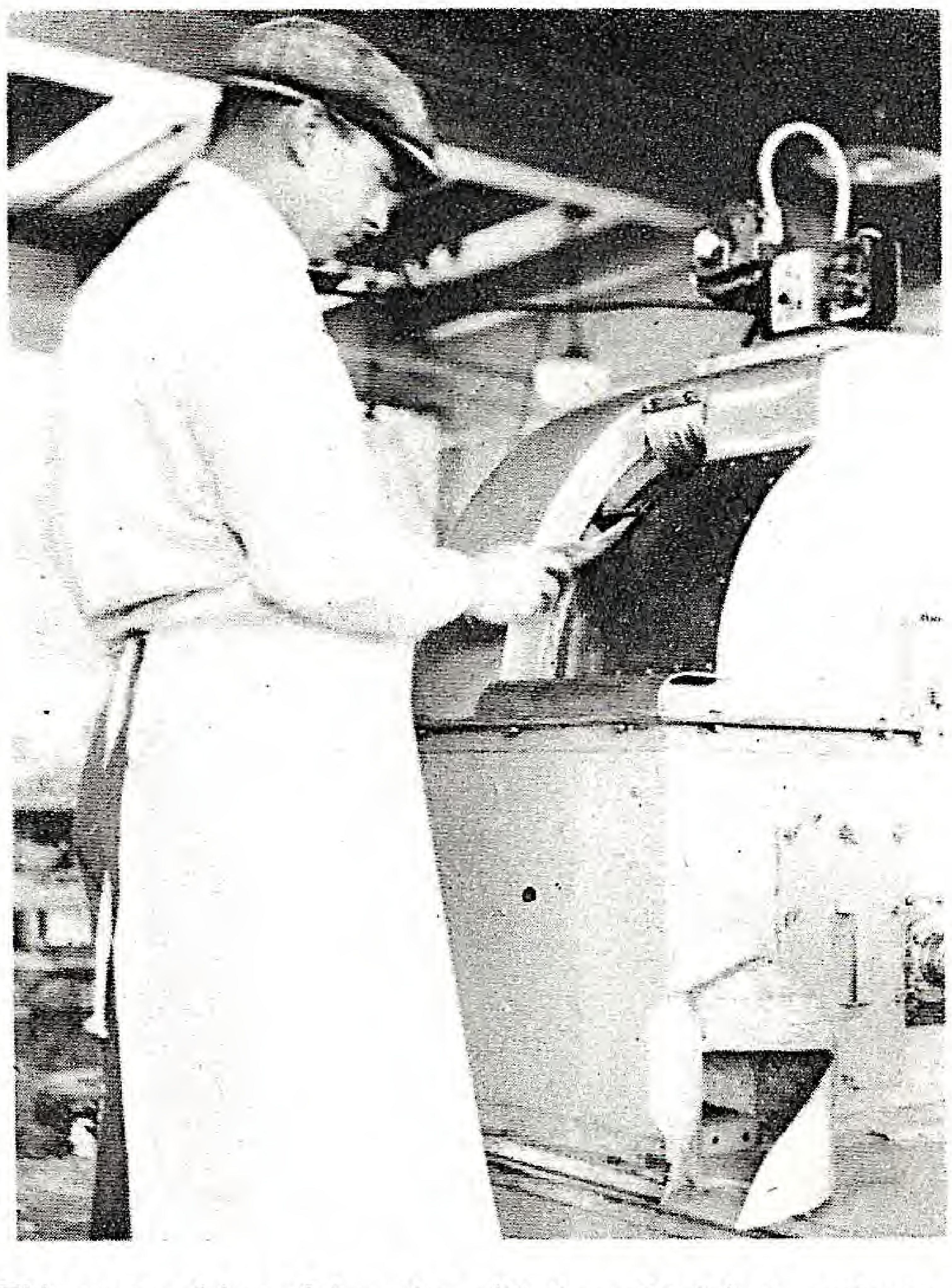
A MIDGET airplane that appears to be flying backwards because its "tail" is mounted in front of the pilot has been developed by an Italian flyer. The odd arrangement is said to aid the stability of the plane and give it more positive control at slow speeds, particularly when landing.

The tiny plane is of the "pusher" type, having its engine located at the rear of the plane and which pushes it through the air rather than pulls it as in the conventional airplane. Two rudders for steering are mounted on the wing. A 17-horsepower motor keeps the machine in flight for 12 hours on 13 gallons of gasoline. The plane is expected to encourage Italian sport flying.



This odd looking airplane was developed by an Italian flyer. The motor is at the rear and pushes plane through the air. The "tail" is in front. Rudders are mounted on the wing.

Machine Scales 60 Fish Per Minute



This motor driven fish scaler will clean 60 fish per minute. A water spray with 75 pounds pressure cuts beneath the scales and removes them as the fish pass through machine.

SCALING sixty fish per minute is the job accomplished by a new motor driven fish scaler invented by a commercial fishery in Cleveland, Ohio. Intense water pressure is used to strip the finny creatures of their scales.

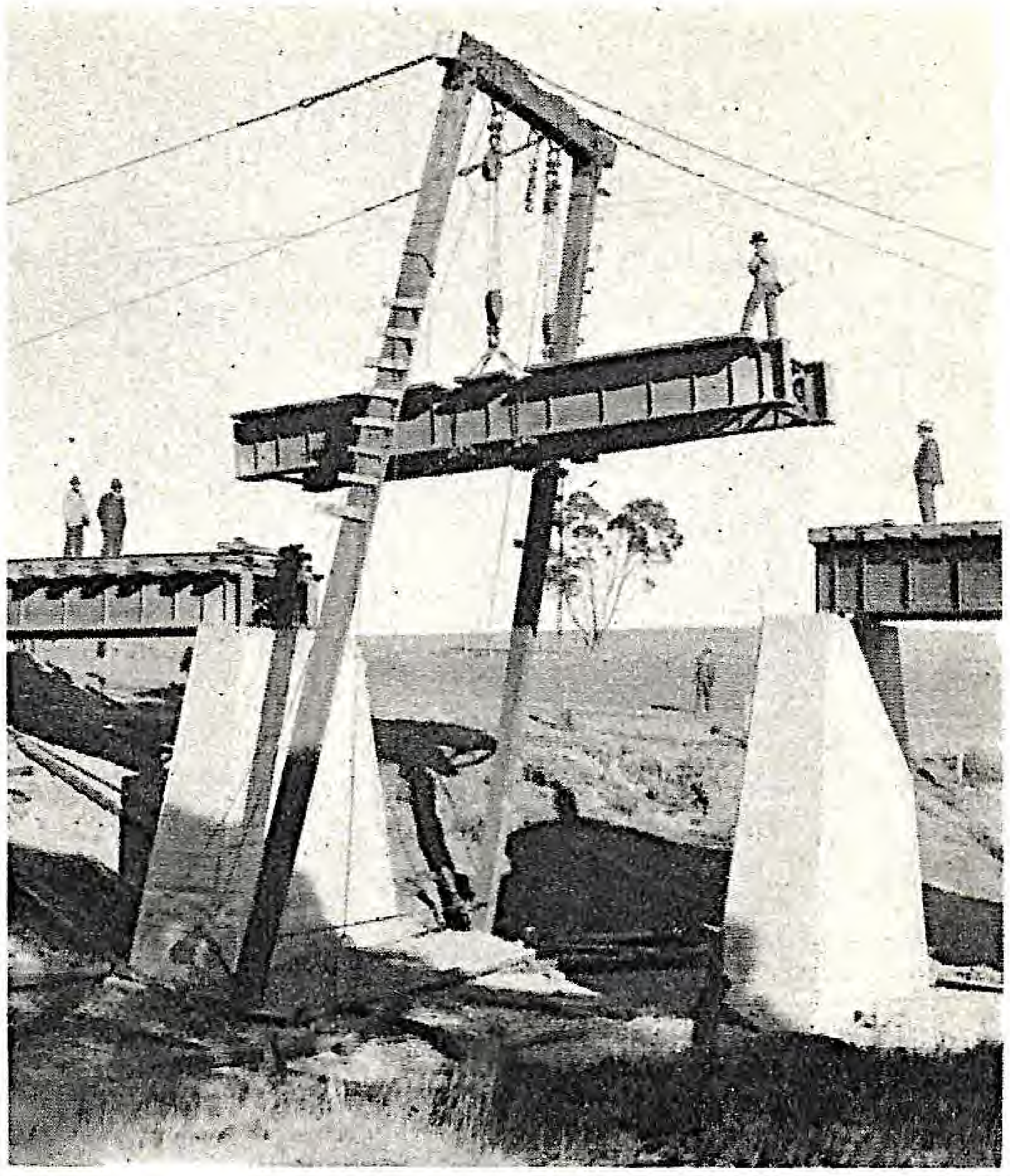
Inserted into the machine tail first, the fish are propelled backwards. A 75-pound pressure spray then strikes them at an angle, cutting beneath the scales and removing them.

Engineers Employ Timber Gantry To Hoist Bridge Spans

FOR some bridge strengthening work on the lines of the South Australian Railways near Hansborough, South Australia, an interesting method was employed for removing the old spans and replacing them with new steel superstructures. Instead of using a heavy railroad derrick, the engineers constructed a gantry to hoist the spans.

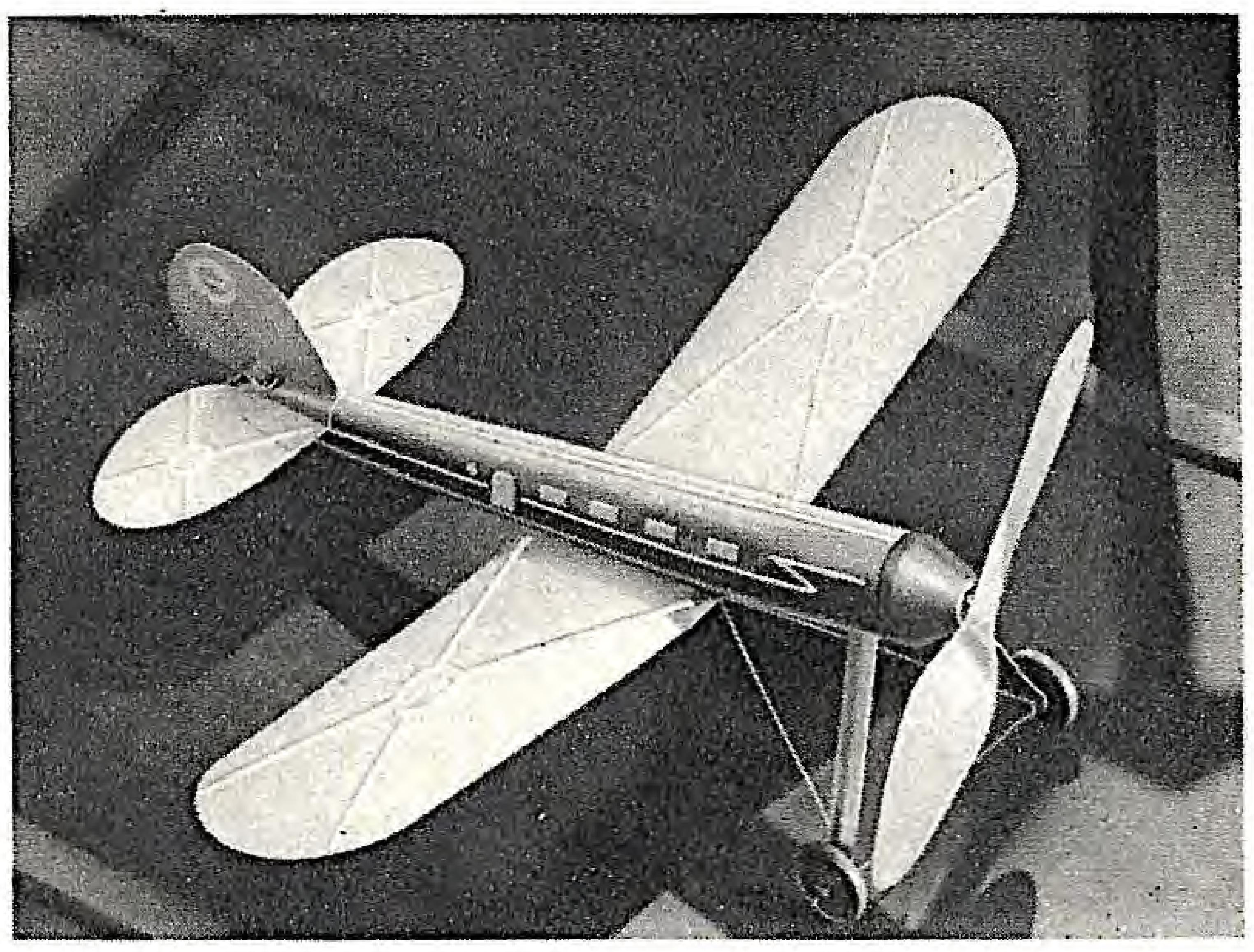
The new steelwork was brought to the bridge site on a flat railroad car and the bridge tracks were put in place before it was swung into its new position. Over the span to be removed, a timber gantry was erected, and while an empty flat car at one end of the span received the old span, the new one was lifted from another flat car and set into place.

Winches were used in lifting the spans and for tilting the gantry as the two spans were exchanged. Despite the bulkiness and weight of the spans, 12 tons, only a small crew of men was needed to handle the job.



This timber gantry was used by Australian engineers to hoist new bridge spans into place. Winches were used in lifting the spans and for tilting the gantry as the spans were replaced.

Metal Plane Model Is Crash-Proof



Practically crash-proof due to its all-metal construction, this "Flyin' Fool" airplane model can be assembled in less than three minutes. Powered by rubber strands, it flies well.

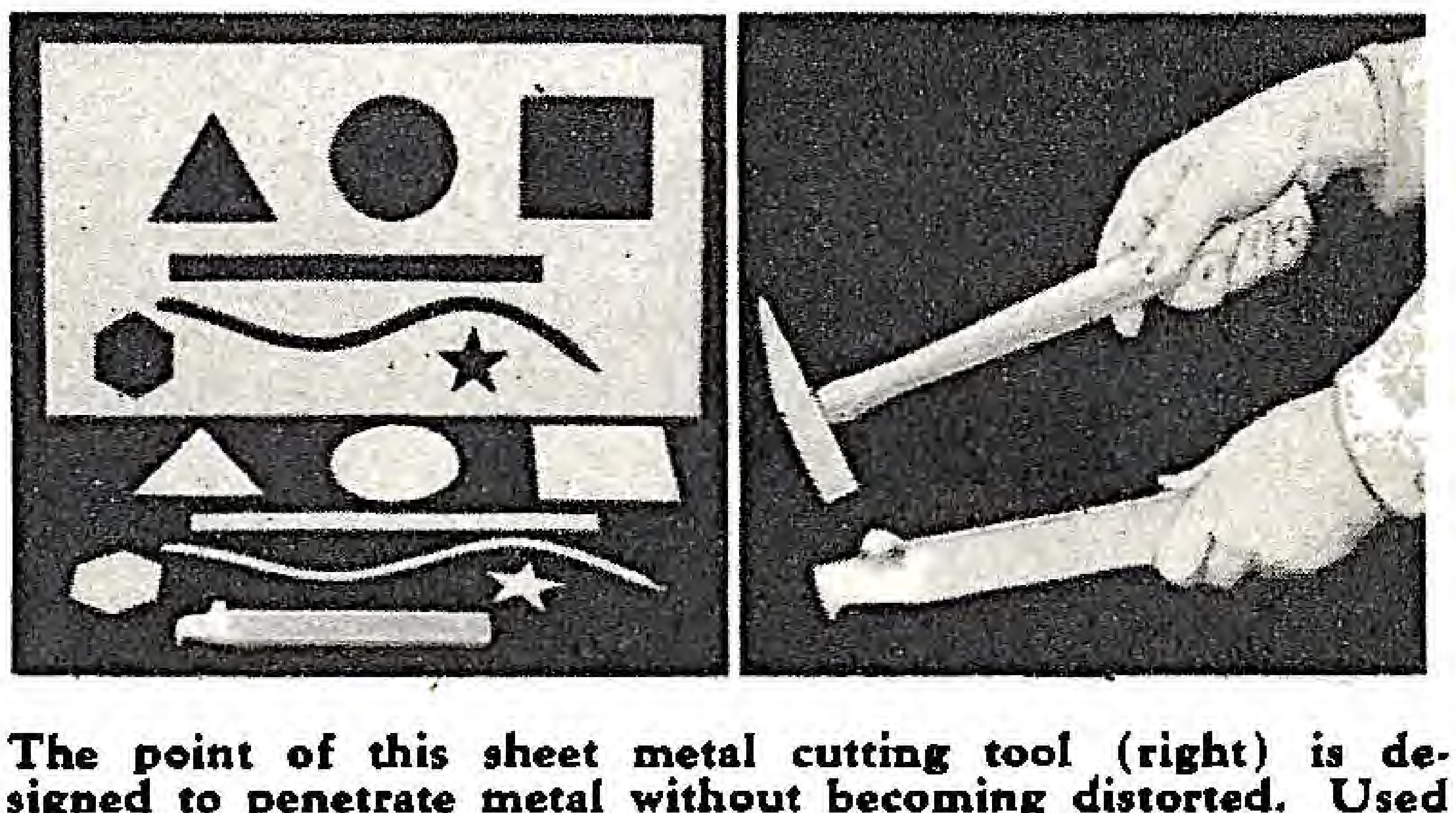
FOLLOWING the trend toward all-metal construction set by the designers of real transport planes, a Detroit, Mich., manufacturer of model airplanes has developed an all-metal flying model. Made of a light weight metal, the models are powered by large rubber strand motors and produce flights of 150-350 feet.

The "Flyin' Fools," as the models are known, are practically crash-proof. The flexible metal covering and wings withstand the most severe crash, suffering no more than a few removable dents.

Hammer Powers Sheet Metal Cutter

A SPECIAL sheet metal cutting tool to be used with a hammer, the point of the tool so designed as to penetrate the metal without distorting or stretching, has been invented by a Canton, Ill., metal worker. The tool is adaptable and practical for cutting metal up to No. 16 gauge, and leaves both cut edges perfectly smooth.

Holes of any size and shape up to a two-inch radius in No. 18 gauge metal can be cut. Ralph W. Poe, the inventor, developed the tool for his metal working business when he was faced with jobs in which the use of the usual available tools was unsatisfactory. The tool is now being distributed commercially.

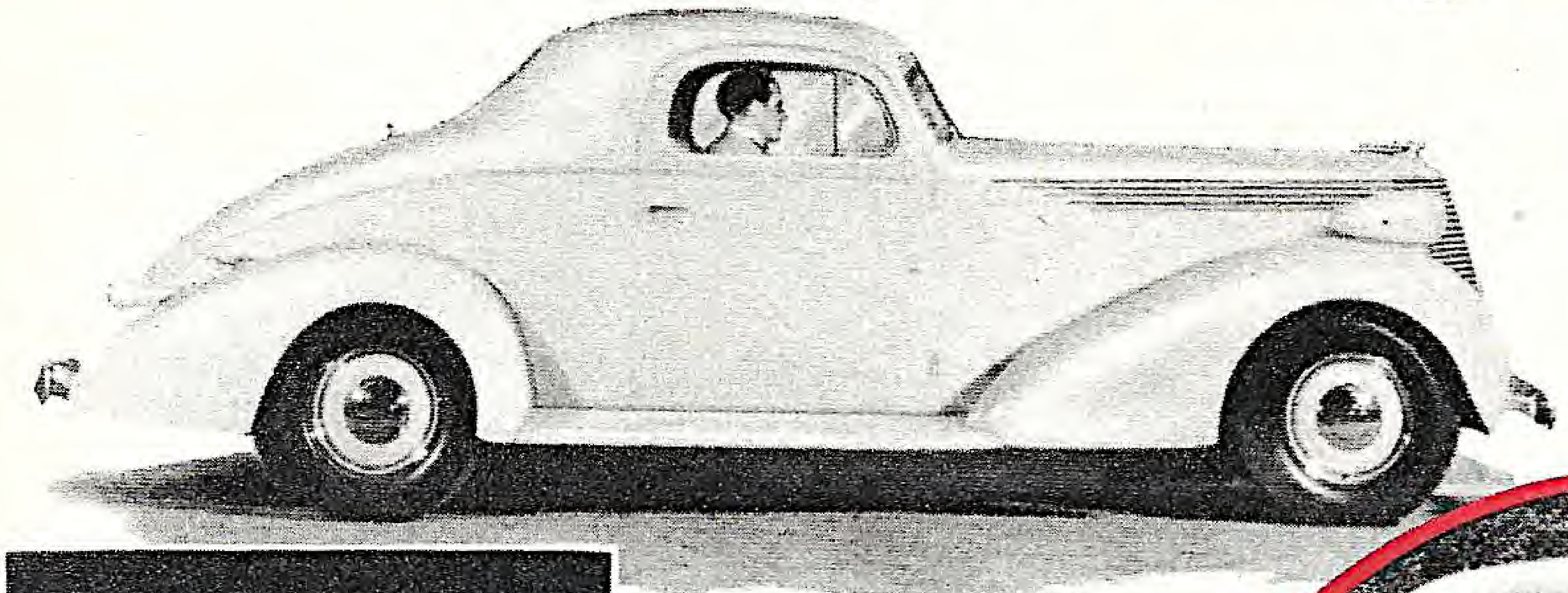


The point of this sheet metal cutting tool (right) is designed to penetrate metal without becoming distorted. Used with a hammer, tool will cut holes and designs in casings.

Engineering Features

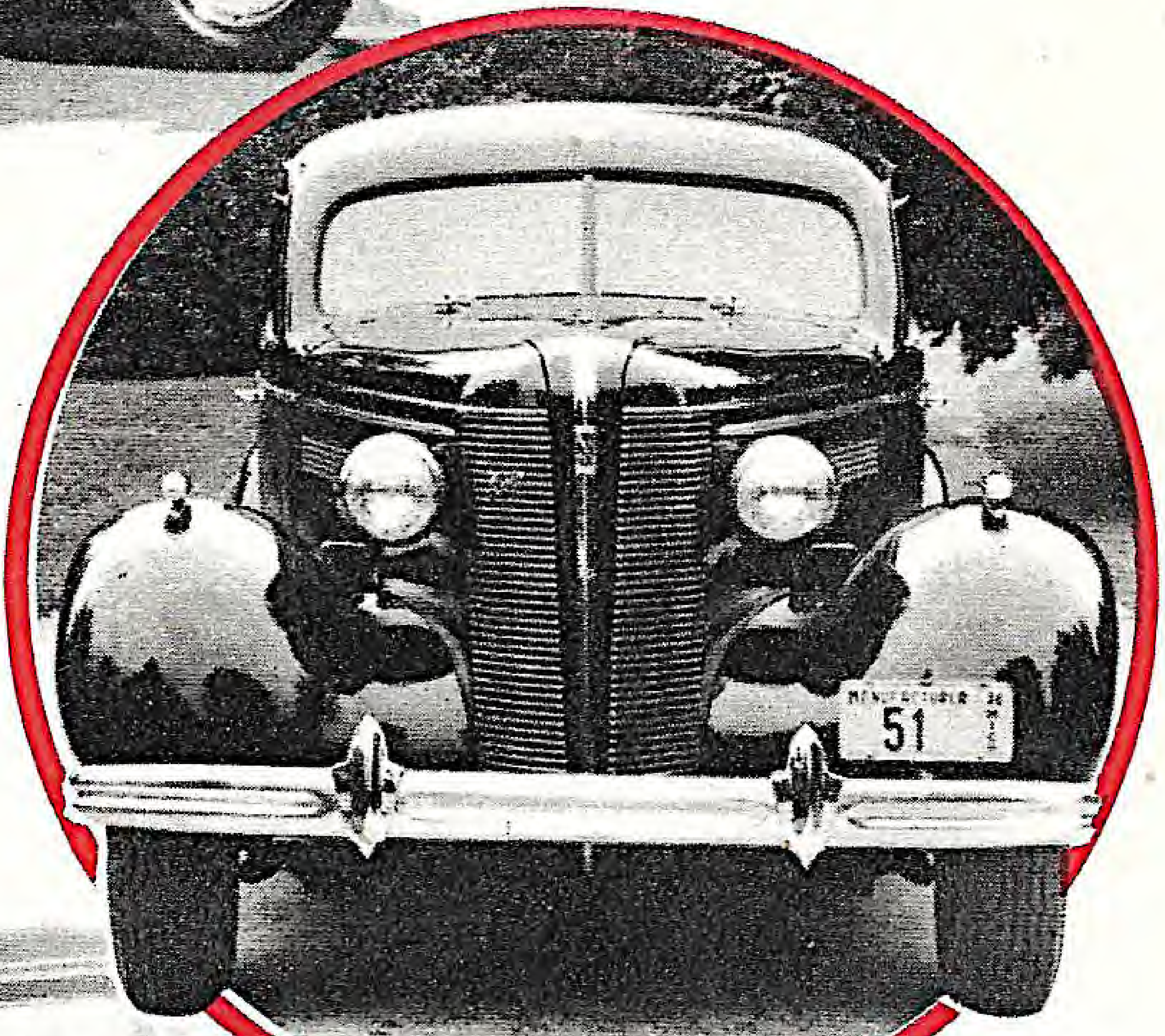
by

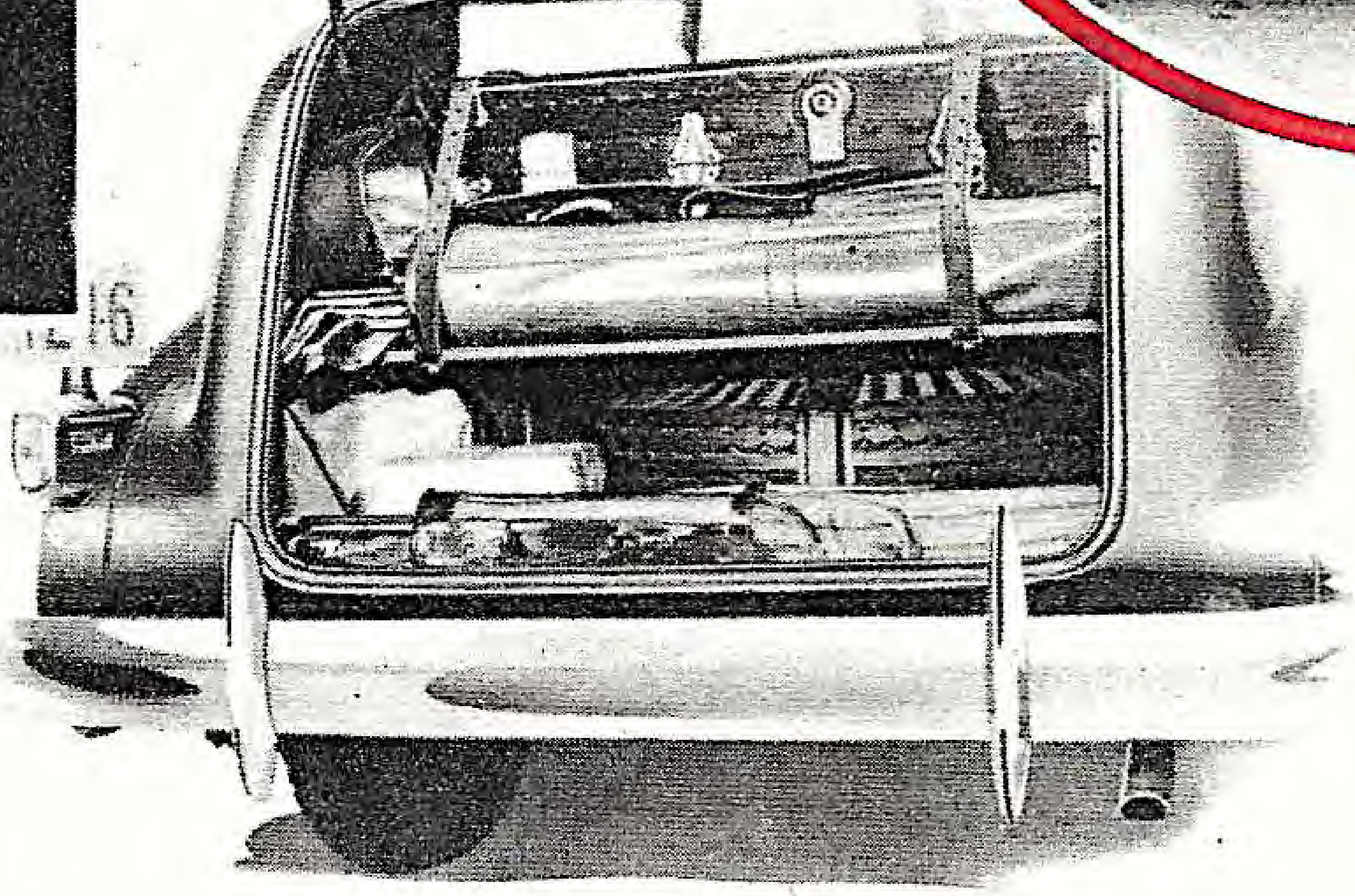
JAMES DYSON



Cars for 1937 are longer and lower as the new Studebaker coupe above illustrates. Seats are wider and interiors generally roomier than in the past.

Alfred Reeves, vice president of the Automobile Manufacturers' Association, is manager of the National Automobile Show in New York.





Front appearance of the new Buick is revealed above. Fenders, lights and radiator have been redesigned. New cars have greater luggage space than in the past. The 1937 Pontiac sedan at the left has space for a steamer trunk, two sets of golf clubs, a spare tire and other things.

AUTOMOBILES for 1937 attain new levels of safety, comfort and flexibility. Some models are little changed in outward appearance but all boast internal improvements of interest to the motorist. Many refinements hitherto found only in machines of high price are available for the first time in makes of the lowest cost.

Most models are longer and lower than the corresponding 1936 machines. Frames have been redesigned to support roomier bodies with wider seats. Hypoid rear axles permit floor dropping without a tunnel ridge. Seats can be adjusted not only forward and backward but up and down. On some models the back angle can be changed at will.

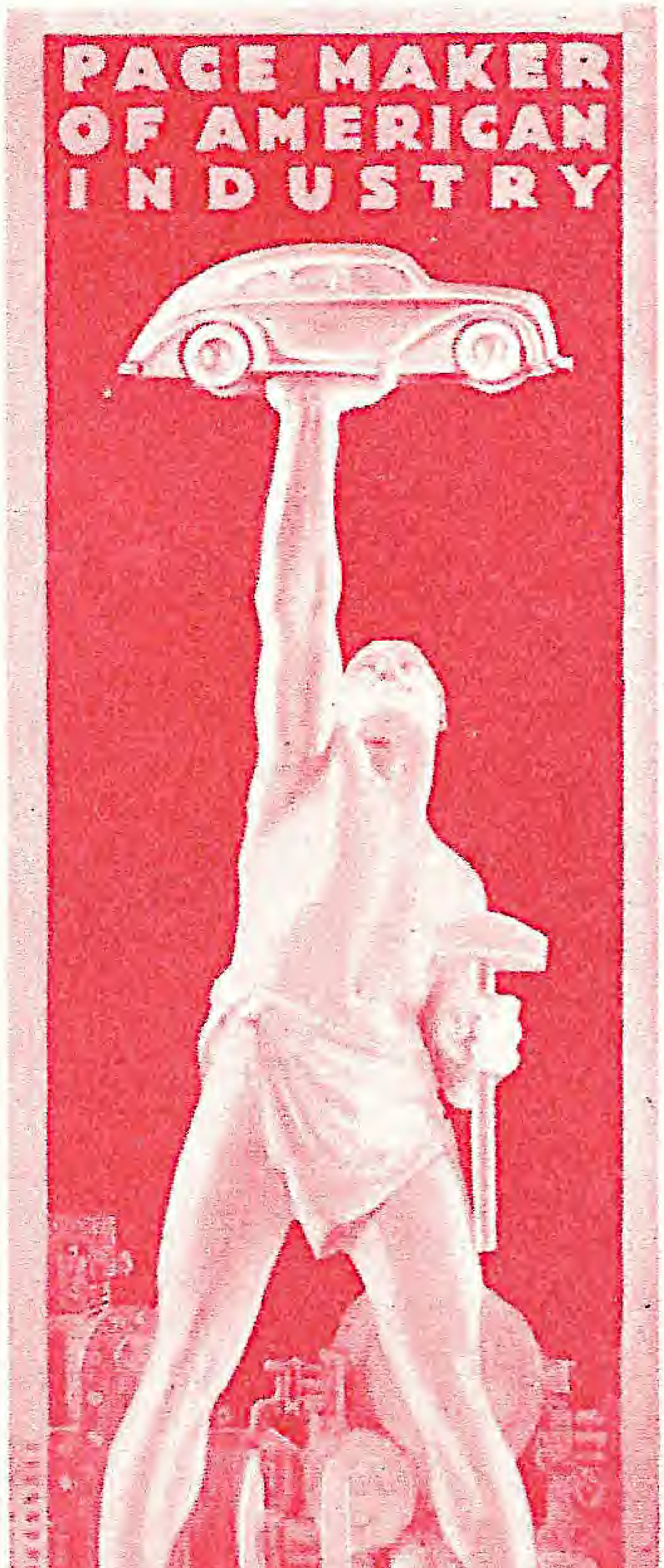
Though bigger, most machines weigh no more than formerly thanks to the continued development of fine alloys. Improved filters promise less oil consumption. Rubber poising, improved body insulation and better shock absorbers make for smoother riding than formerly.

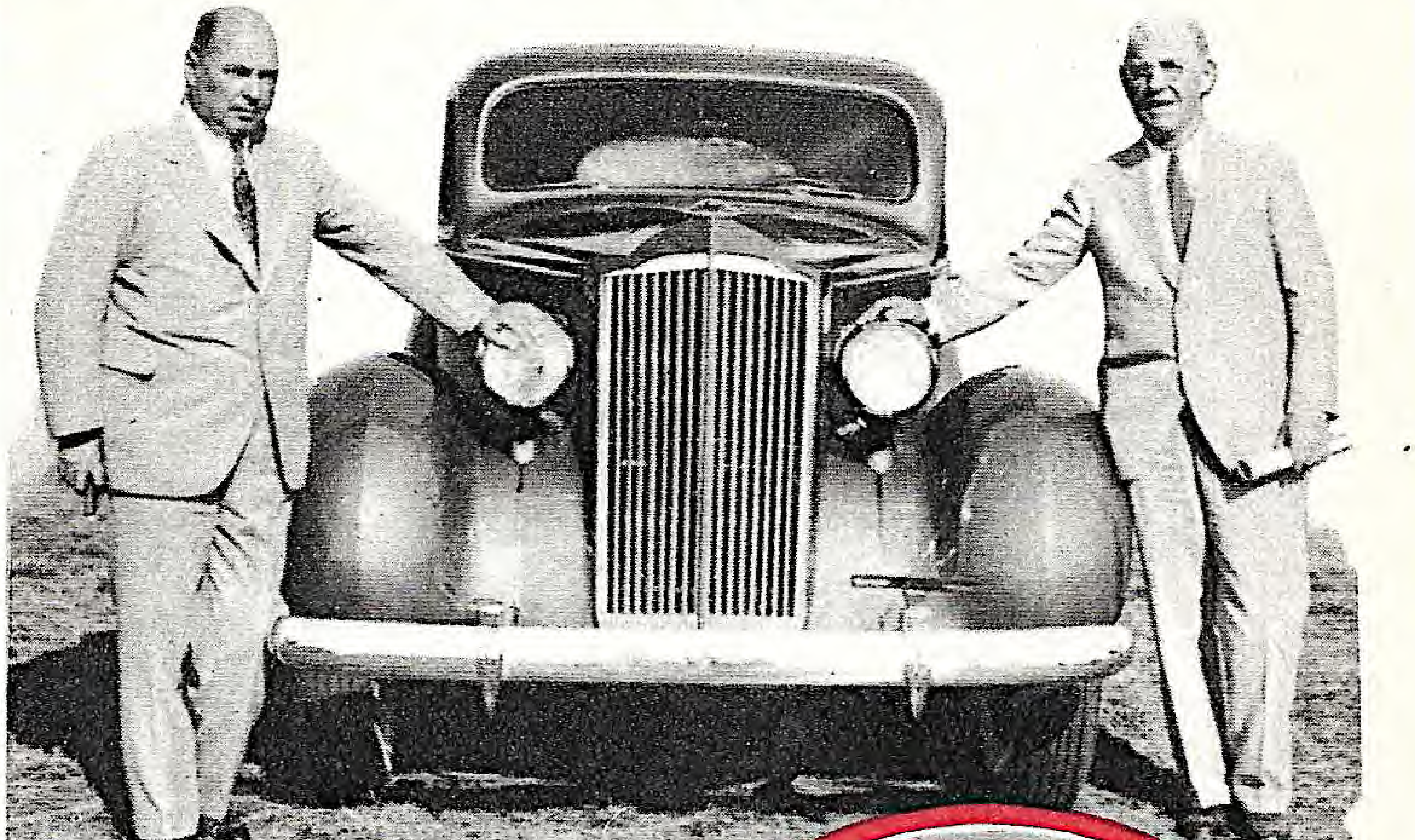
In accordance with accepted safety thought, many instrument panels have been revised to eliminate all projections. There are fewer sharp door handles.

Half a dozen manufacturers offer a new automatic defroster which releases a current of warm air from the car heater on both sides of the windshield.

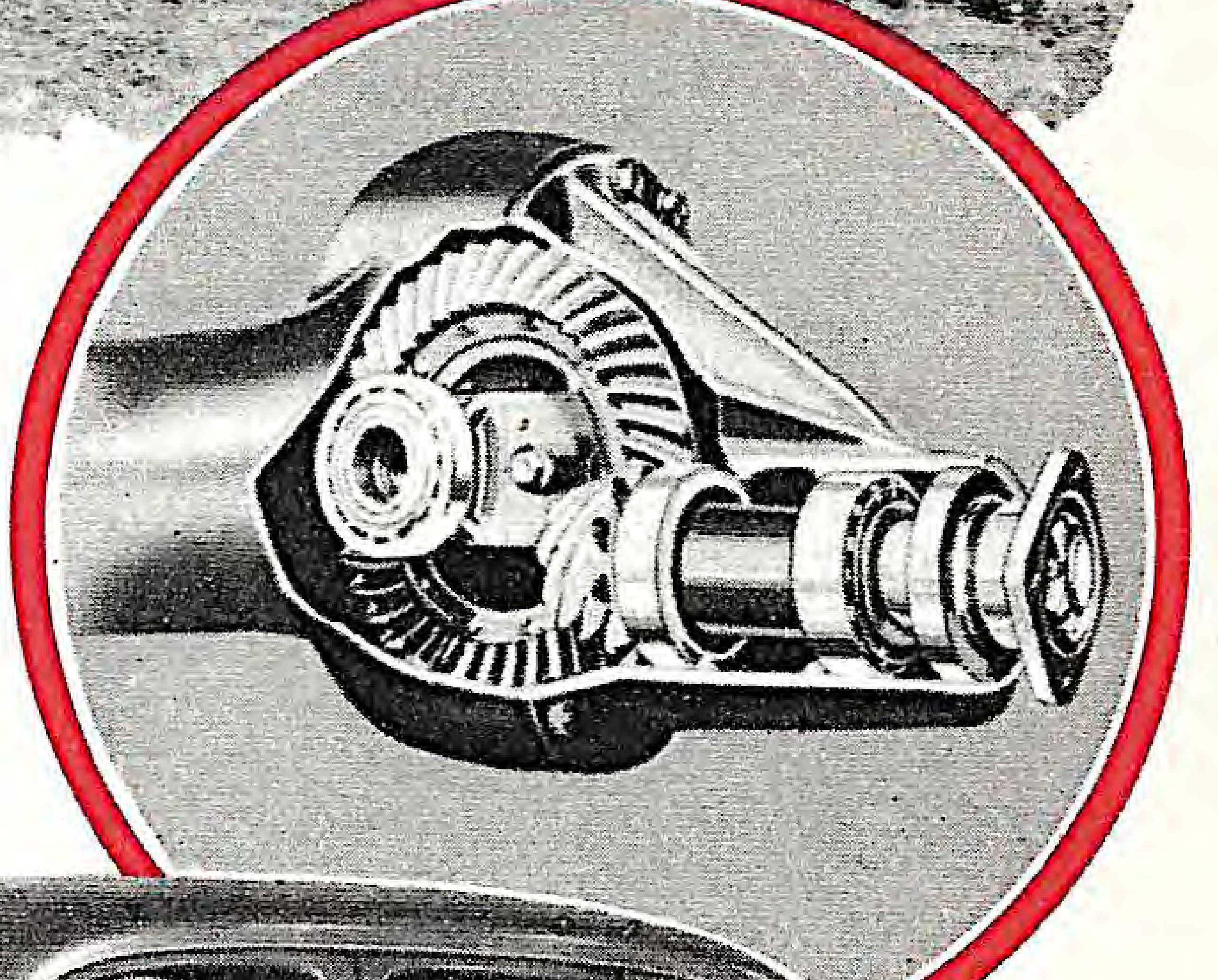
Body colors are brighter and upholstery more luxurious. Bright colored plastic substances appear in the fittings. Most machines have provision for radio sets. Batteries are larger and generators are arranged to take

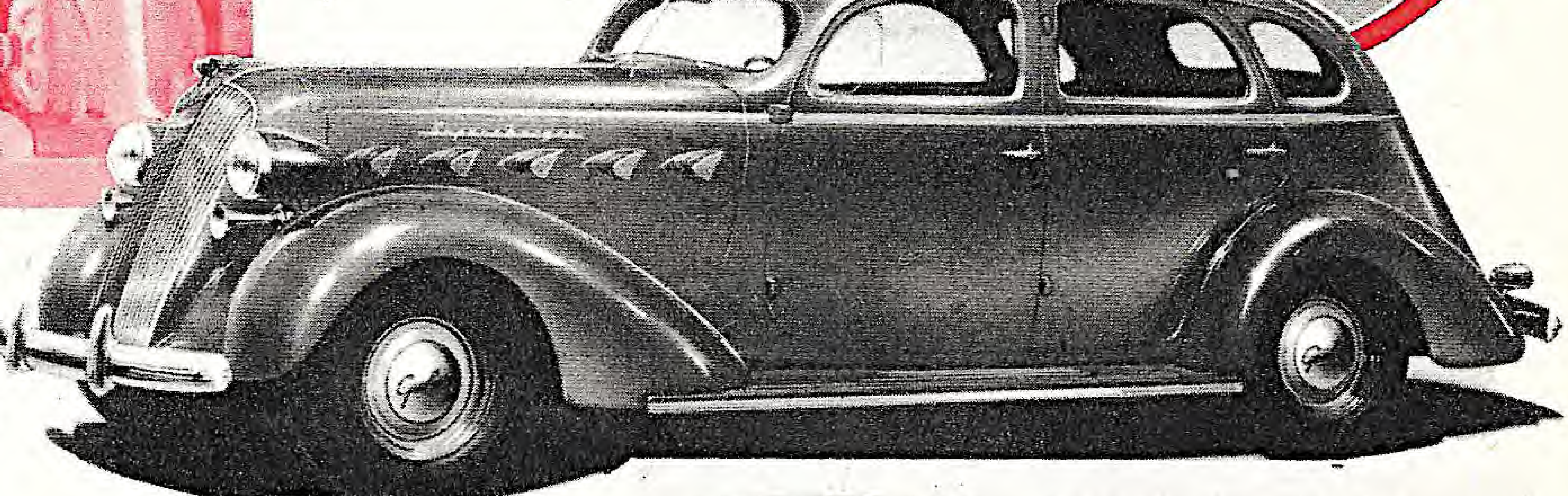
of 1937 Auto Marvels



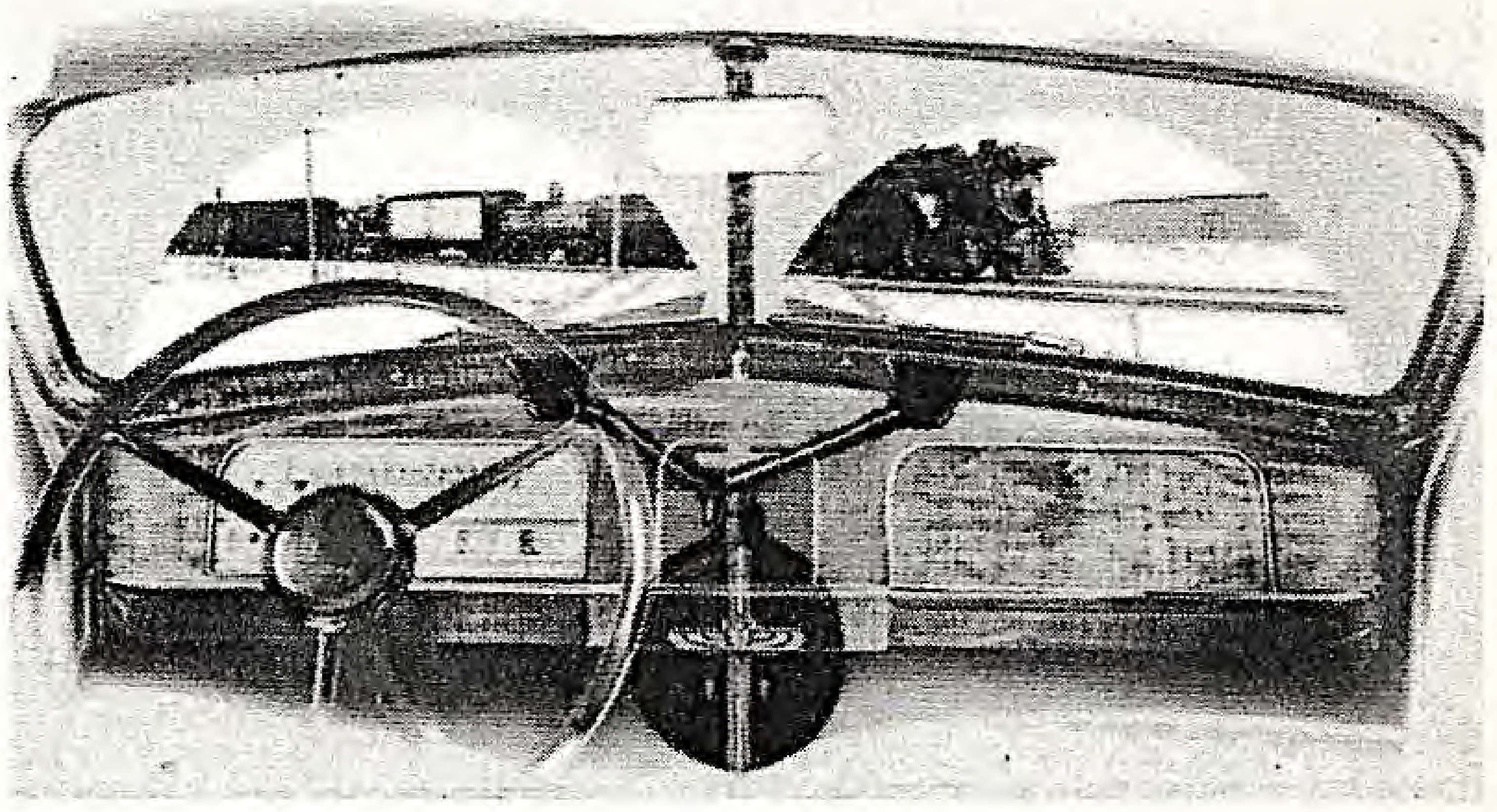


Packard's new six is shown above with M. M. Gilman, General Manager and Alvan Macauley, President. Several new cars feature hypoid rear axles. That of the new Chrysler Royal is shown at the right. The improvement permits lower cars. Automobiles with it include Pontiac, Plymouth, Studebaker.





This emblem is the symbol of the National Automobile Show opening in New York on Armistice Day. Trailers will have space for the first time.

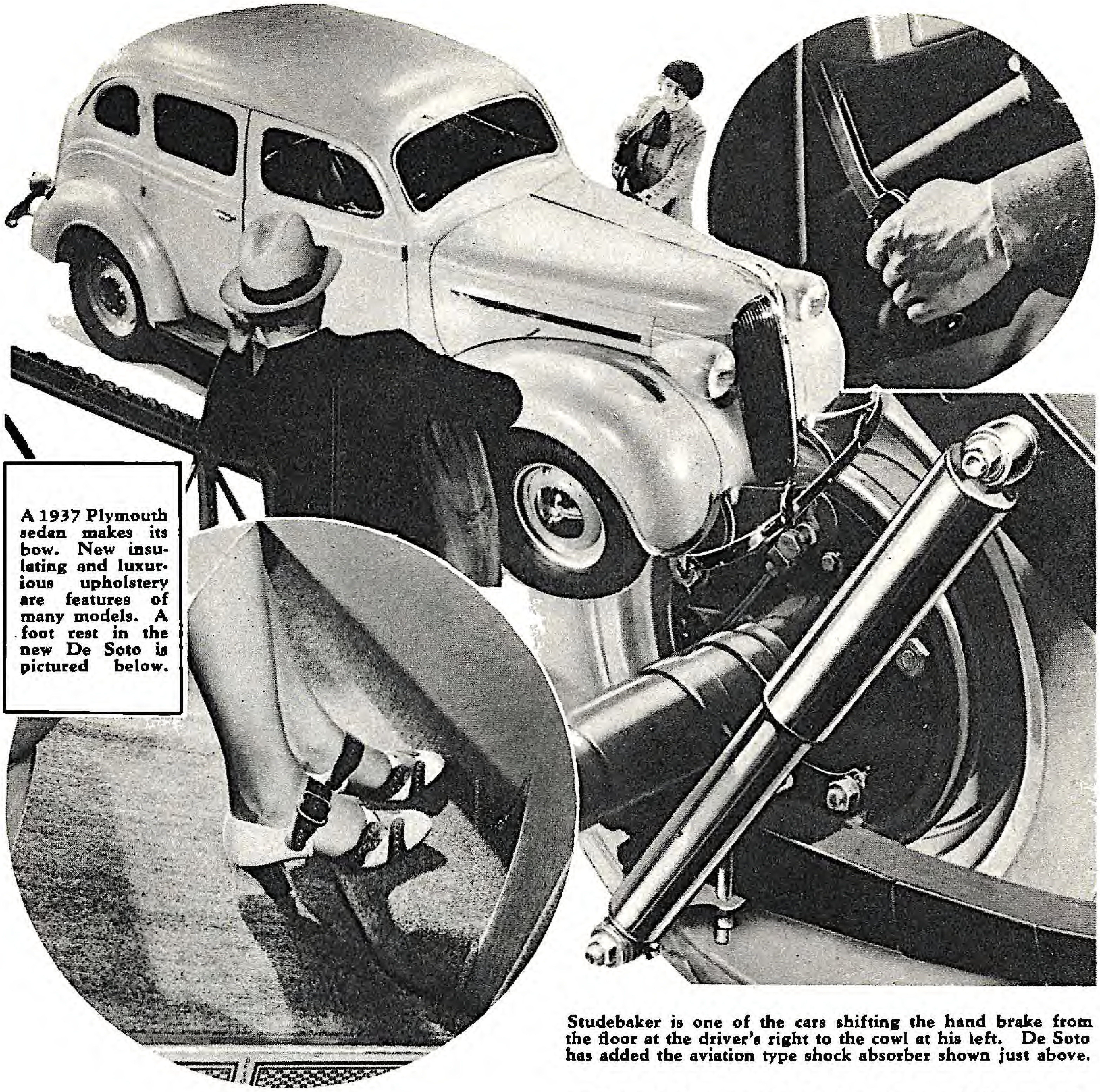


The sedan is a 120 Graham with supercharger. One of several new automatic windshield defrosters is pictured below. The one shown is that of Pontiac. The devices are expected to reduce the toll of winter accidents by improving visibility.

care of the increasing numbers of accessories requiring electricity.

Chevrolet offers a new and improved steel body. Ford has an array of comfort and economy features but withheld announcement for the National Automobile Show opening in the Grand Central Palace in New York on Armistice Day.

Packard and Chrysler are offering new models in the lower priced fields. The former has a new "Six" and the latter the "Royal," also a six-cylinder machine. The Packard Six has a wheelbase of 115 inches and resembles the larger 120 which is con-



A 1937 Plymouth sedan makes its bow. New insulating and luxurious upholstery are features of many models. A foot rest in the new De Soto is pictured below.

Studebaker is one of the cars shifting the hand brake from the floor at the driver's right to the cowl at his left. De Soto has added the aviation type shock absorber shown just above.

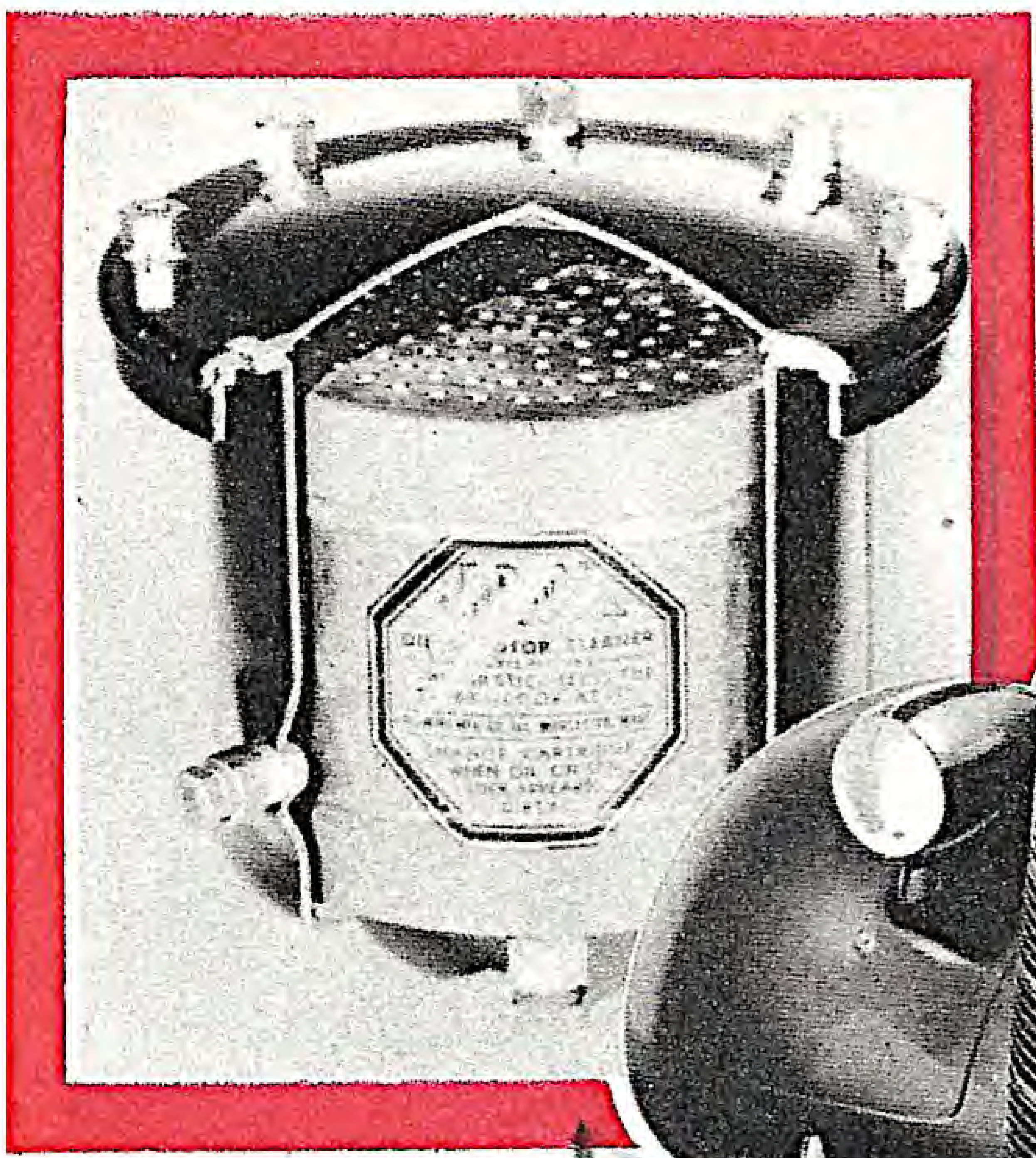
tinued with improvements. The Royal has a 93-horsepower engine with 228-inch cubic piston displacement and the high compression ratio of 6.5 to 1. The engine, however, is lighter than the previous Chrysler Six. The car is roomier and has the hypoid rear axle.

The hypoid rear axle, permitting removal of the driveshaft tunnel in the rear compartment, is also a feature of the new Plymouth. Hypoid design permits a lower propeller shaft and uses longer and stronger gear teeth. For this Plymouth uses amola steel.

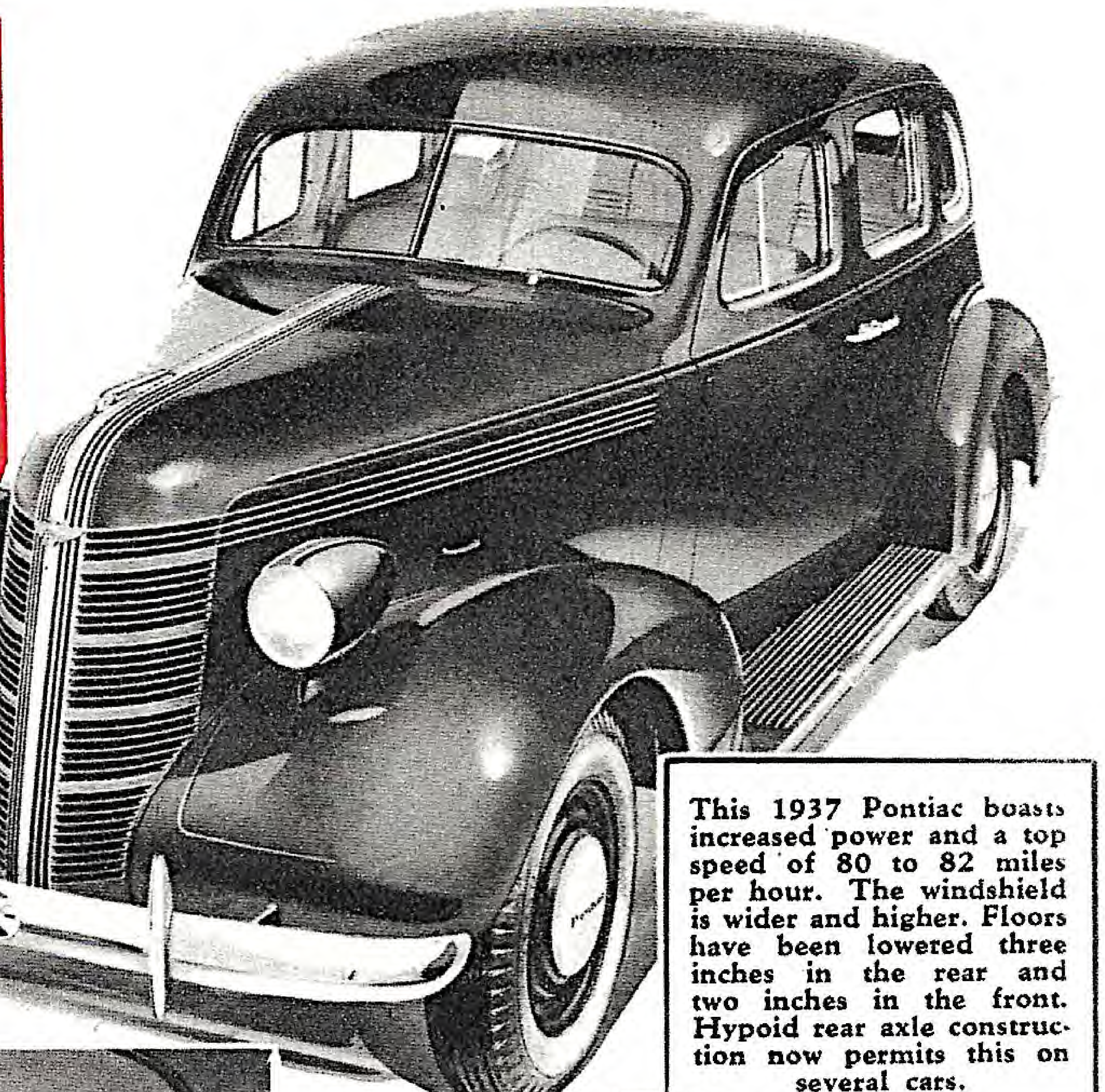
Other features include a larger body, with cowl, windshield posts, steel roof and back panel all formed in a single solid unit; a safety interior swept free of projections; rubber outrigger support for the body and insulation against weather and noise; built-in defrosting and anti-fog vents at the base of the windshield. The streamlining is greater and the overall length has been increased to 194 inches on all models.

Pontiac promises additional economy with two lines of sixes and eights longer in wheelbase and with larger and more powerful engines giving higher top speed and faster acceleration. The six-cylinder bore and stroke has been raised from 3⅜"x3⅞" to 3$\frac{7}{16}$"x4" and the displacement from 208 to 223 cubic inches. An increase of ¼ inch in the stroke of the eight, from 3½ to 3¾ inches, has expanded the displacement from 232 to 249 cubic inches. S. A. E. horsepower of the six is 28.3 and that of the eight 33.8. Standard compression ratios are 6.2 to 1. Top speeds are 80 to 82 miles per hour for the six and 85 to 87 for the eight.

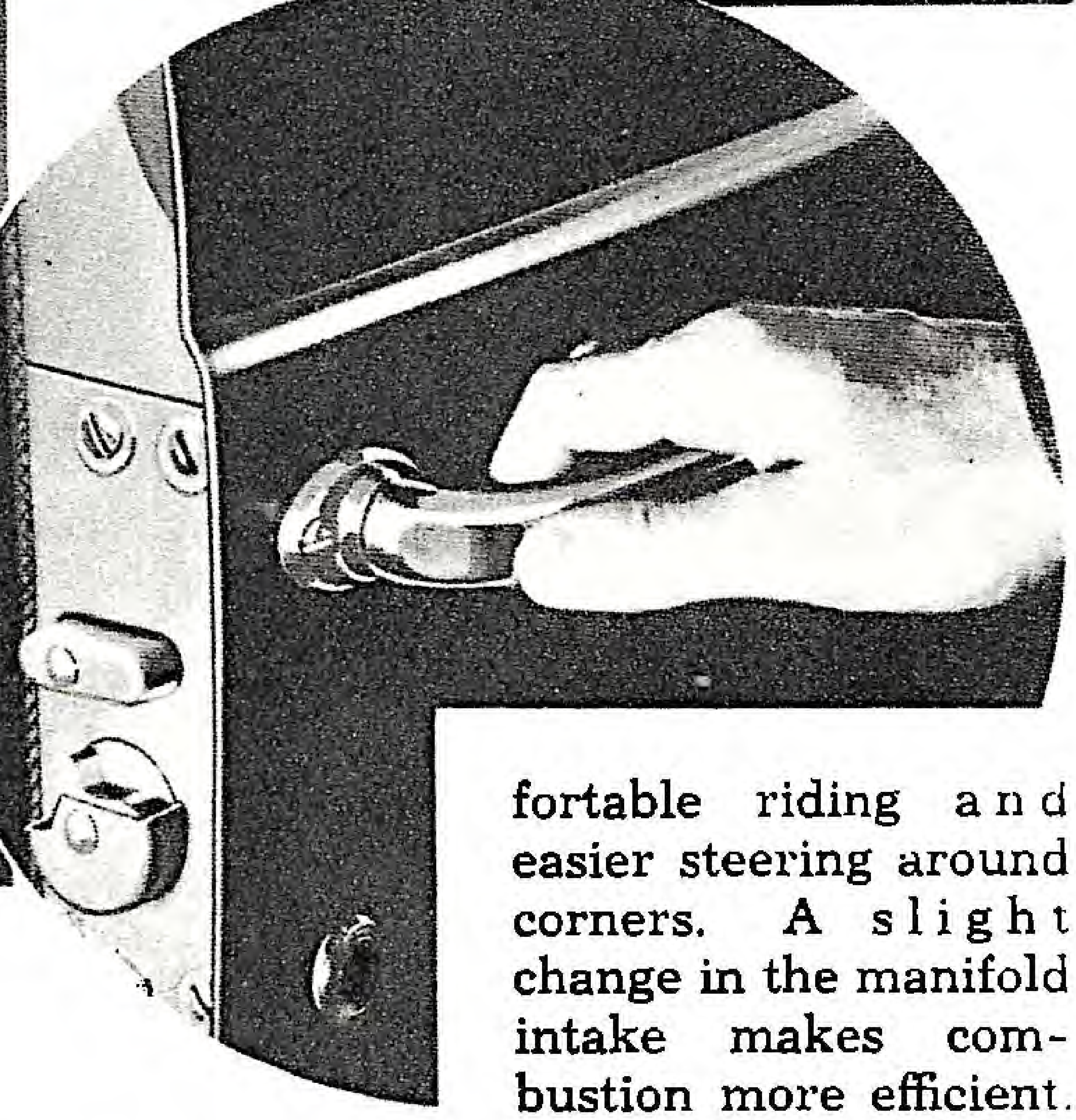
Floors have been lowered three inches in



Oil need be changed only with the seasons when this cleaner is used, says Studebaker. A cartridge is to be changed when the oil becomes dirty.



This 1937 Pontiac boasts increased power and a top speed of 80 to 82 miles per hour. The windshield is wider and higher. Floors have been lowered three inches in the rear and two inches in the front. Hypoid rear axle construction now permits this on several cars.



Seats are wider than ever. A child is shown sleeping full length on a Packard backseat. Sharp door handles have been rounded as a safety measure as the Studebaker handle at the right illustrates.

rear and two inches in front compartments with elimination of foot-catching tunnels for transmission. The emergency brake lever has been moved from the right to the left of the driver under the cowl providing more space. Provision is made for a built-in windshield defroster. Visibility has been improved by making the windshield two inches wider and higher and increasing its angle of slant from 31 to 39 degrees.

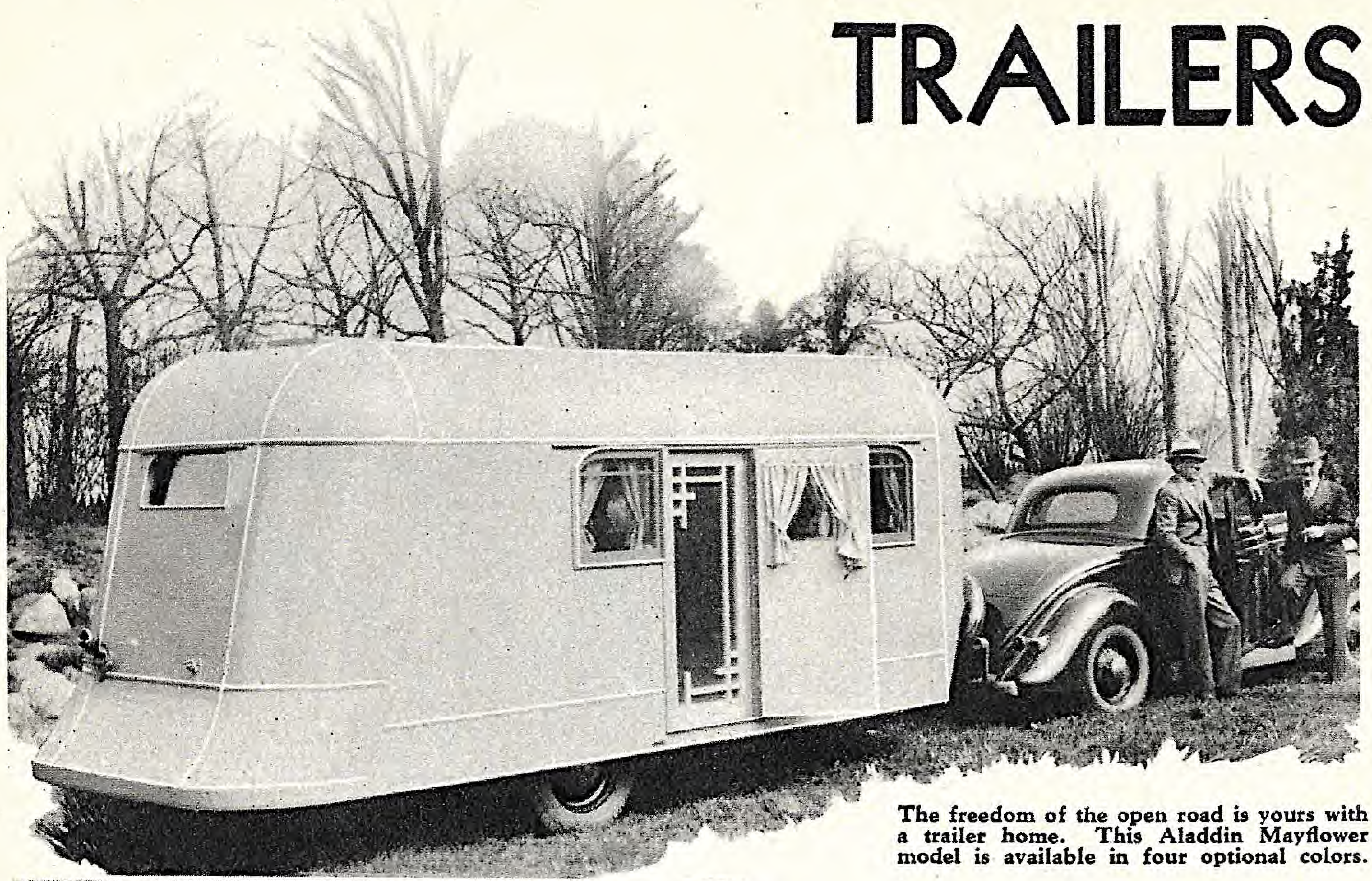
A new double-drop "X" type structurally rigid frame of cantilever construction is embodied in the Pontiac chassis. A change has been made to open type front wheel knee action units with the promise of more comfortable riding and easier steering around corners. A slight change in the manifold intake makes combustion more efficient.

Buick styling is new for 1937 and all models have been stepped up in horsepower with improvements in acceleration and general performance. A mark of 19 miles per gallon at 30 m.p.h. is claimed for the Series 40 cars powered by a 100-horsepower valve-in-head straight eight engine.

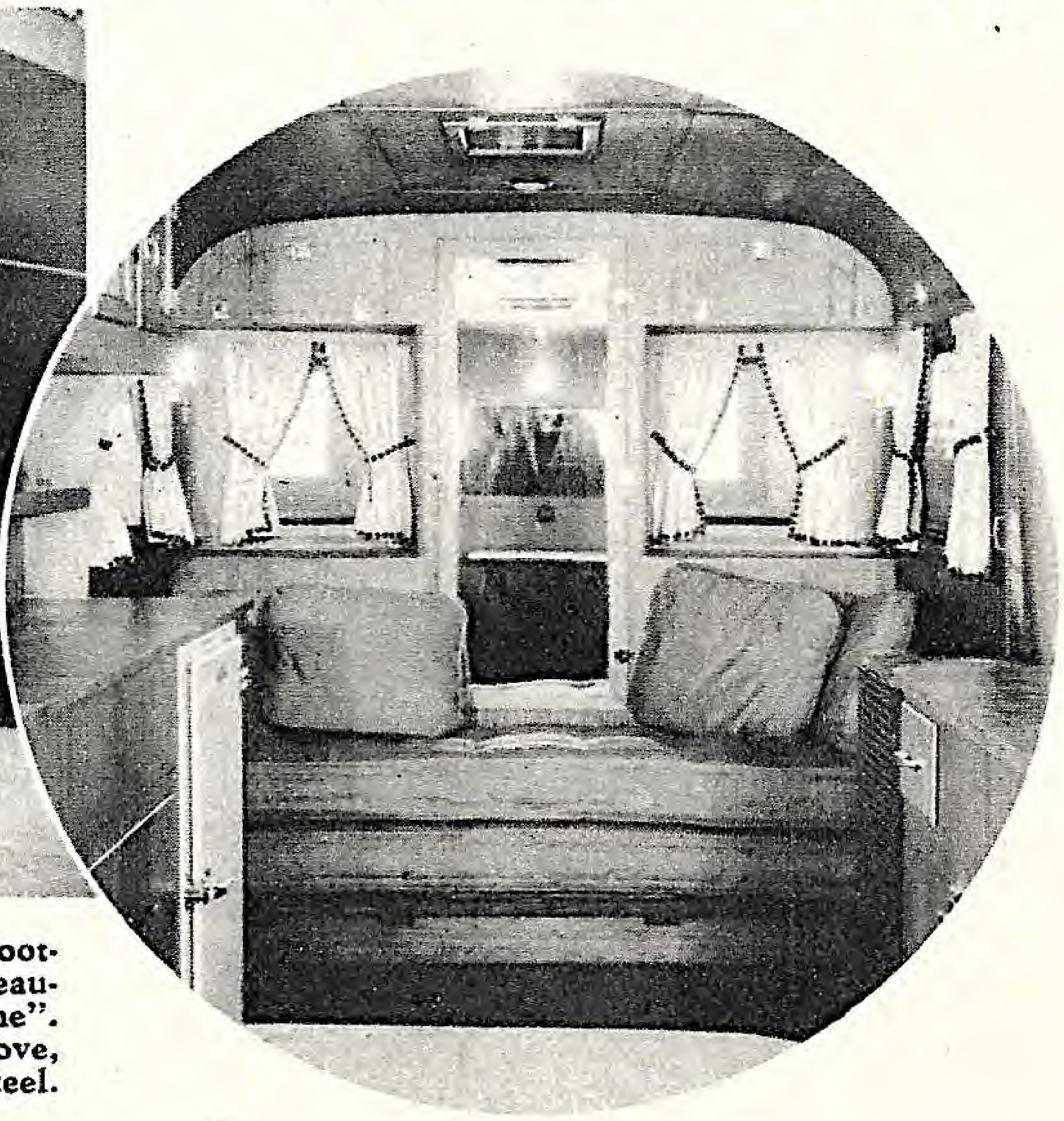
This engine has been stepped up from 93-horsepower by an increase of ¼ inch in stroke, boosting displacement to 248 cubic inches, adoption of streamline intake valves, a new exhaust system which increased back pressure, and an increase in compression ratio from 5.65 to 5.70 to 1. Horsepower of the

[*Continued on page* 118]

TRAILERS



The freedom of the open road is yours with a trailer home. This Aladdin Mayflower model is available in four optional colors.



Above—C. E. "Tiny" Thornhill, noted Stanford University football coach, and his wife are trailer enthusiasts. Circle—The beautiful mahogany finished interior of the Hayes "Motor-Home". Priced from $395 up, this trailer features an enclosed heating stove, refrigerator, and double folding couch. Body is welded steel.

ALONG with other distinctively automobile features, Mr. and Mrs. America are going to have plenty of steel in their 1937 traveling homes. The automobile makers have invaded the camp trailer field and the new 1937 lines, shown at the national automobile shows and elsewhere, reflect the influence of experienced designers and engineers who plan scientifically and produce by precision methods on an enormous production scale.

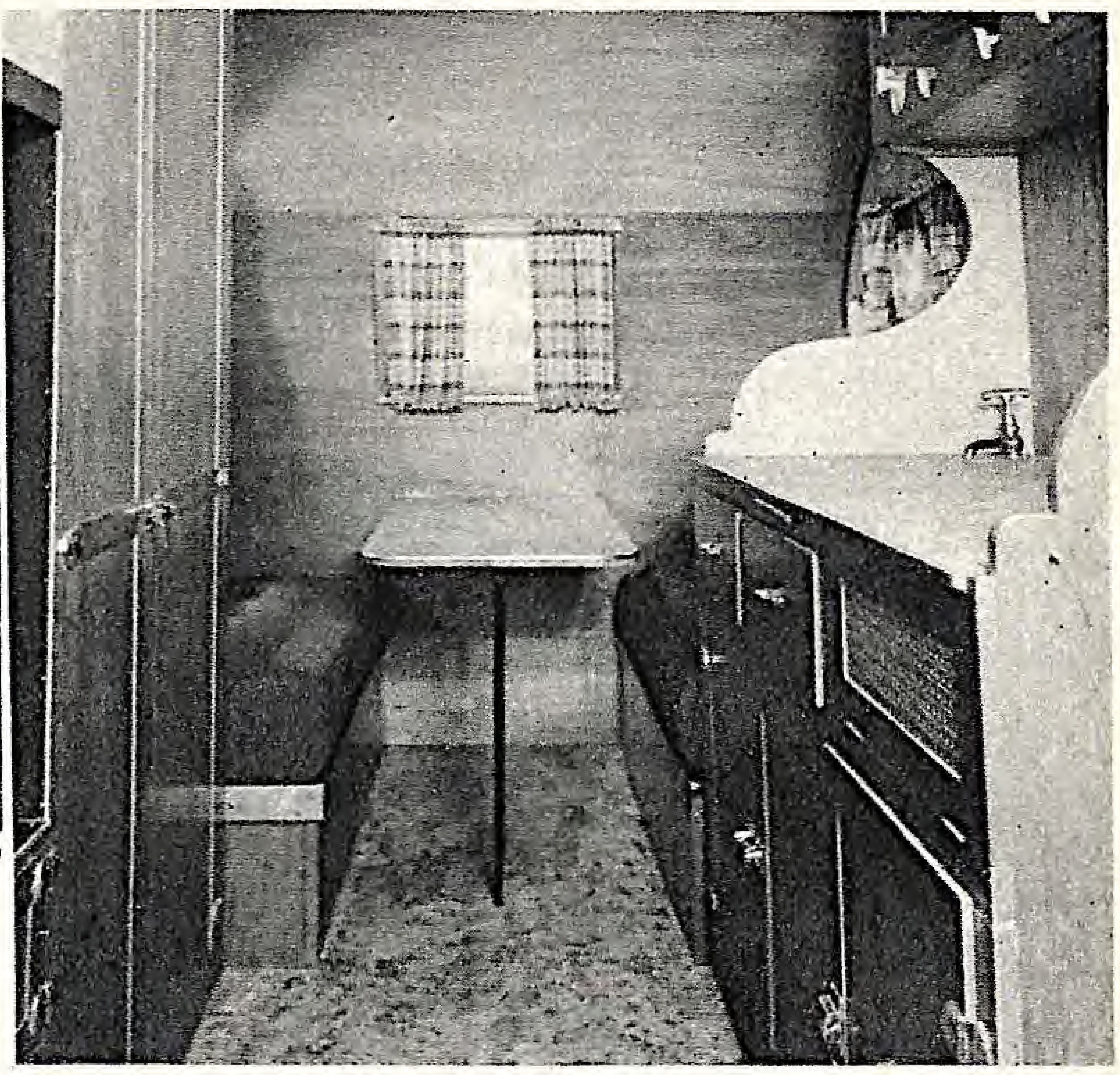
Steel enters the trailer picture definitely as a material for chassis and frames. One automobile builder—Pierce-Arrow—is showing the first all-metal trailers with chassis and frame of steel and the body of aluminum.

Two other old line automotive companies, the Federal Motor Truck Company, Detroit, and the Hayes Body Corporation, Grand Rapids, Mich., have also brought out house trailer lines in which steel chassis construction and precision manufacturing are featured. At least two more well-known car makers are expected to enter the trailer field.

for NEXT YEAR

by
LOU FOLEY

Modern trailers provide ample room for home comforts. This Federal Motohome contains 104½ square feet of floor space.



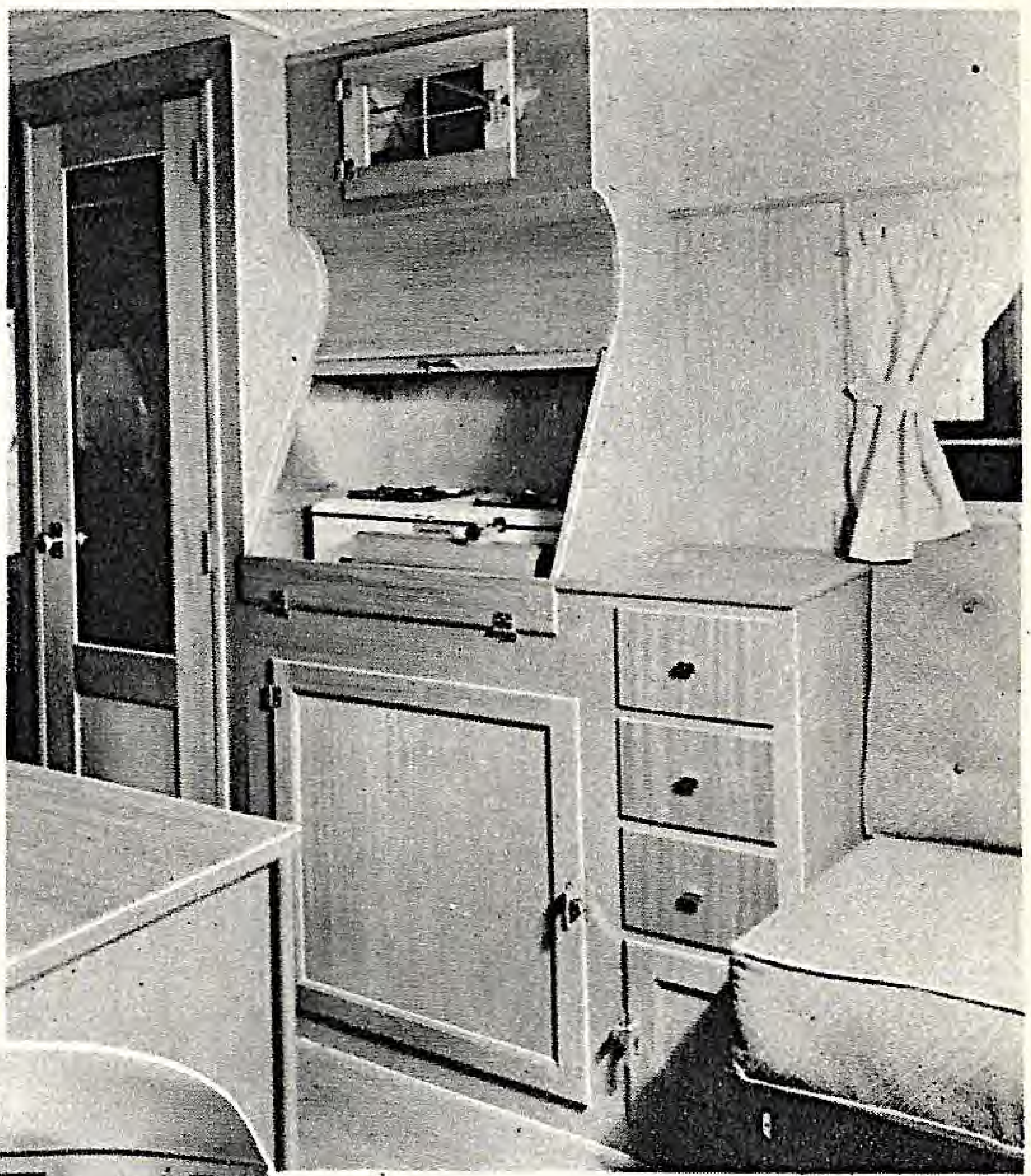
Interior view of the Motohome showing the Pullman type diner that accomodates four people. The seats are arranged at night to make a bed 50 inches wide. Note the large cupboards and drawers. Covered sink basin provides extra table.

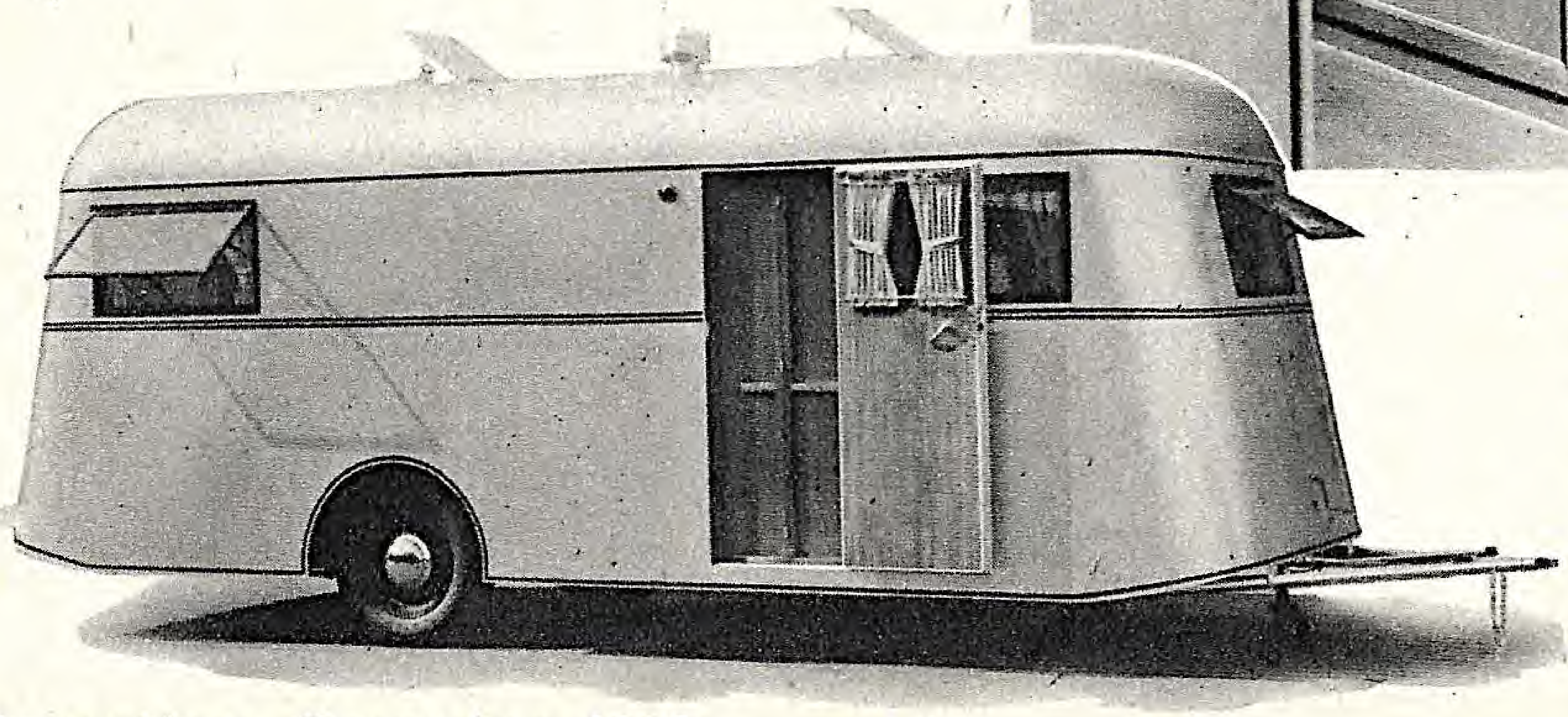
Steel chassis for the 1937 trailers are electrically welded so that they are, in effect, one piece. In the case of the Pierce-Arrow chassis all-steel channel and box section members are provided which are of welded construction. Chassis cross members, body sills, vertical pillars, horizontal bars, roof bows and longitudinal members are in themselves of U-beam type but all of them become box or tubular members when the outside paneling is riveted to them.

To meet the competition set by these new rivals, established trailer manufacturers are going to steel construction as rapidly as they can transform their plant facilities. Eleven out of 40 of the larger makers have already announced their switch to steel for their trailer chassis.

With the changes mentioned above, the camp trailer has advanced a long step forward

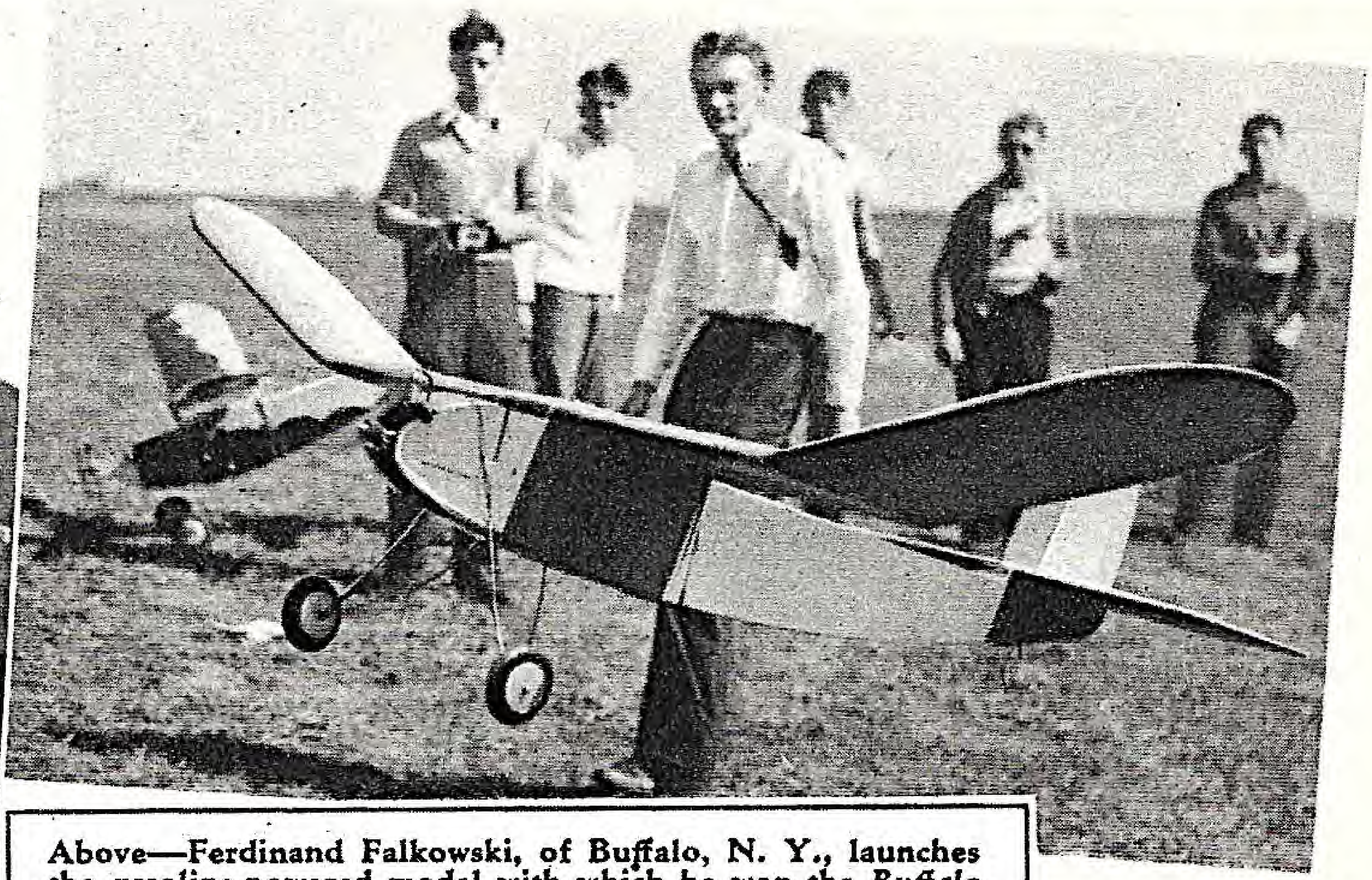
[*Continued on page* 140]



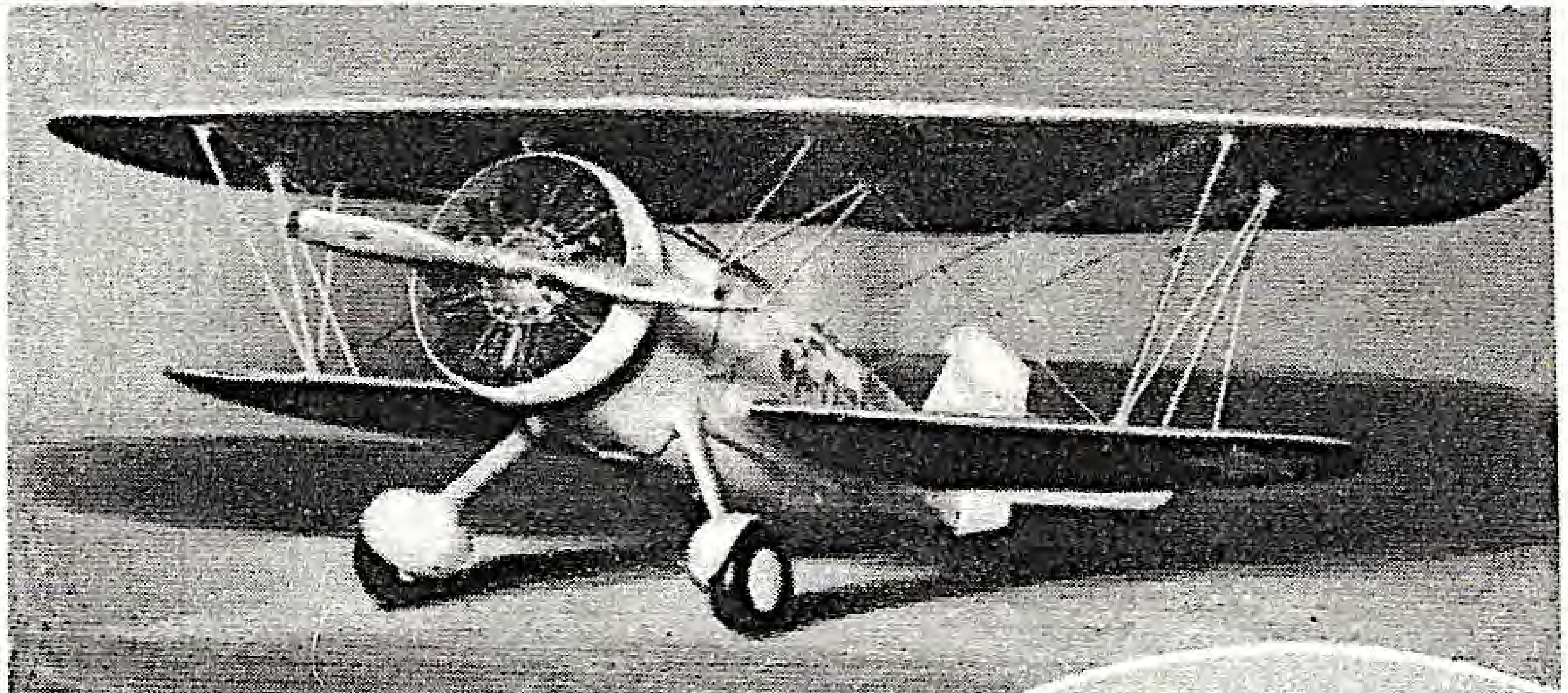


Left—The Pierce-Arrow Travelodge, said to be the first trailer built with an all-steel chassis and body frame plus a metal paneling body. Above—Travelodge interior. The two-burner cook stove, metal lined cabinets, drawers for silverware, refrigerator, inlaid linoleum work table, and other refinements appeal strongly to the critical feminine eye and mind.

CLEVELAND YOUTH Wins NATIONAL JUNIOR AVIATORS CHAMPIONSHIP

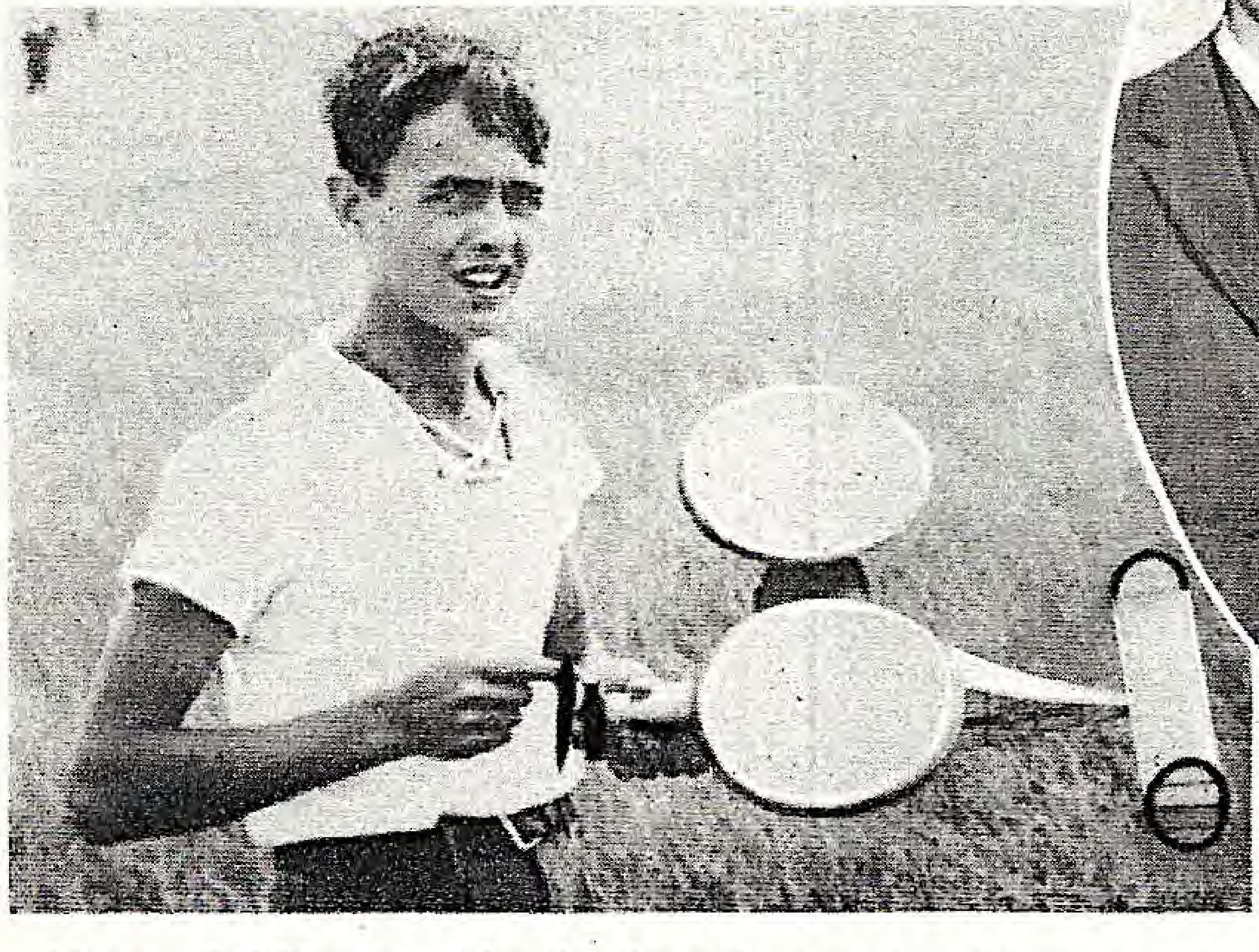


Above—Ferdinand Falkowski, of Buffalo, N. Y., launches the gasoline-powered model with which he won the *Buffalo Times* trophy and Junior Aviators National Championship for gas models. The 6 ft. plane was aloft 22½ minutes.



Left—This beautiful scale model of a Curtiss Navy Hawk won the Sperry trophy for Bronik Soroka, of Cleveland, Ohio. Controls operate from cockpit. It took 800 hours to build the model.

Above—Chester Lanzo, of Cleveland, Ohio, displays the three trophies he won at the Scripps-Howard Junior Aviators Model Meet held at Buffalo, N. Y. He won the All-Around Champion trophy given by Major Al Williams, noted speed pilot, as well as the stick model and acrobatic events staged at the meet.



Above—Ed Deemer, Cleveland youth, won the original model contest with his "disco-plane." From the ranks of these air-minded youngsters will come our future pilots and engineers.

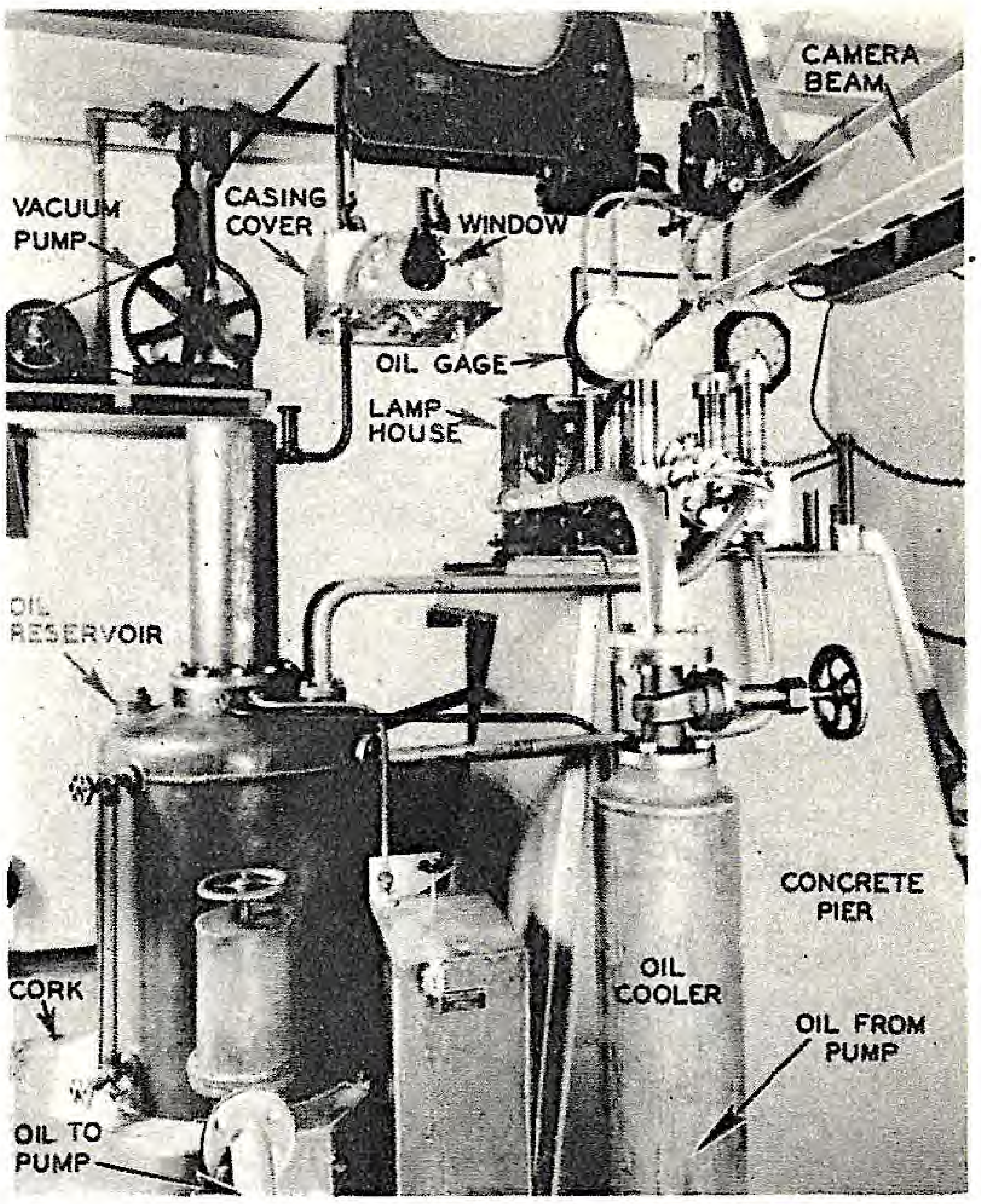
Above—Three *Buffalo Times* Junior Aviators and their championship trophies:—left to right, Roman Lyszezarz, with Goodrich trophy, Don Mertens, with Bendix trophy, and Ferdinand Falkowski, with *Buffalo Times* trophy.

Centrifuge Machine Aids Research Work At University

AN ULTRACENTRIFUGE machine with an operating speed of 60,000 r.p.m., and which creates a centrifugal force equal to 350,000 times the force of gravity, has been installed at the University of Wisconsin. It was developed by Professor Svedberg, of the University of Uppsala in Sweden, the only other college in the world to have such a machine. A gift of the Rockefeller Foundation, it cost $27,000.

The machine will yield important information regarding molecular weights and other data difficult to measure. Liquid material to be studied is placed in a cell inserted in the revolving rotor. Quartz windows in the cell enable an observer to note the effect of the centrifugal force. Oil driven turbines drive the rotor at speeds up to 60,000 r.p.m.

An 18-foot camera suspended on a beam over the cell window takes photos of the whirling mass and a comparison of consecutive photos enables the rate of settling of the dissolved substance to be calculated. Knowing the rate of settling, the size of the molecules can be determined.



The rotor of this centrifuge machine at the University of Wisconsin revolves at 60,000 r.p.m. It takes an hour to attain its full speed and about the same time to come to a stop.

Blind Flying Done In Ground Plane

The machine being demonstrated by this young lady is used to train pilots in blind flying. Under its hooded cockpit, pilots "fly" by instruments and radio without leaving earth.

DESIGNED to train pilots safely in the art of blind flying without leaving the ground, a new training machine has been installed at the Bureau of Air Commerce in Washington, D. C. The stubby, hooded "plane" has controls similar to a real plane and can perform any flying maneuver.

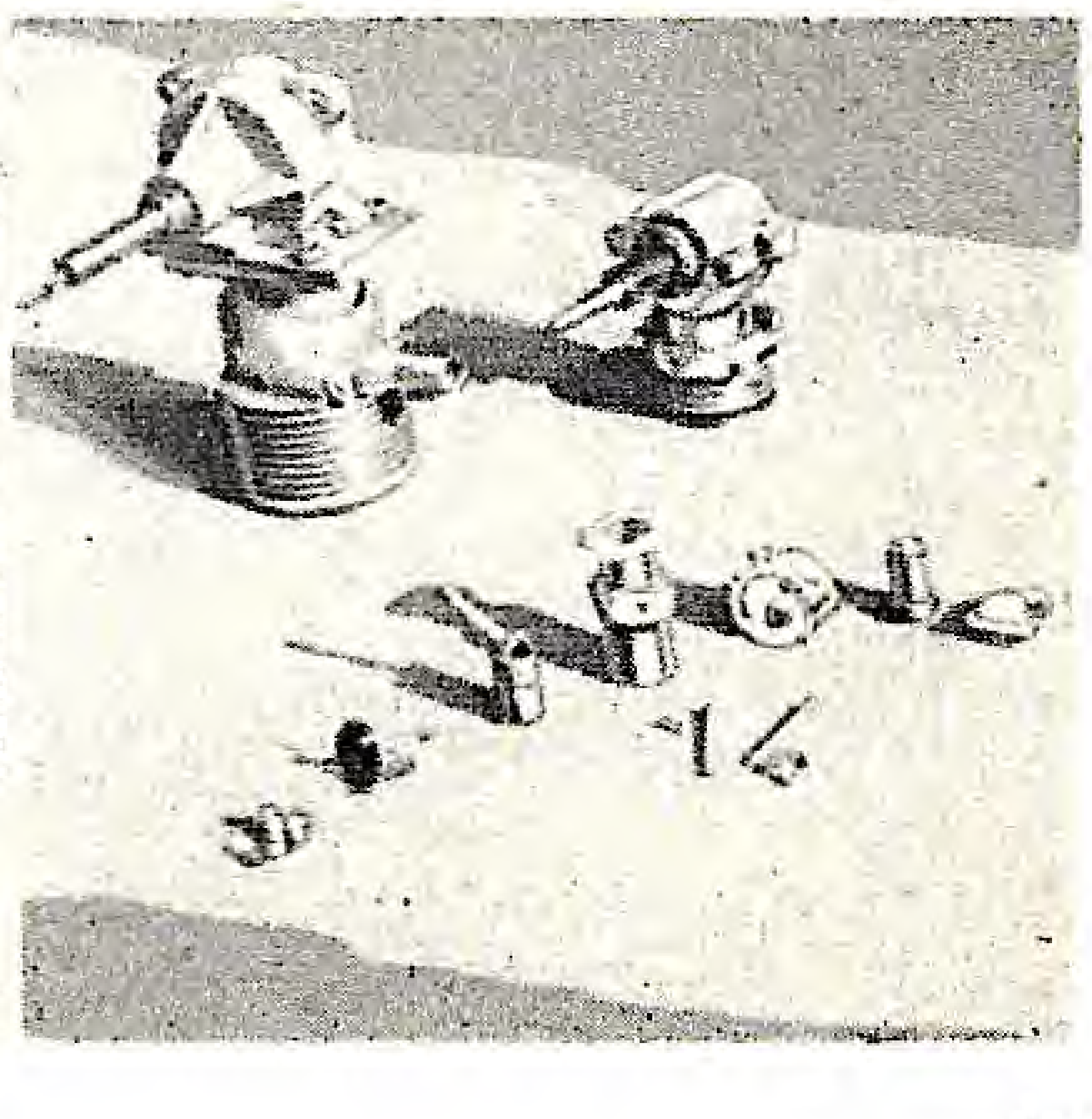
Within the covered cockpit, the pilot flies a course by maps, radio beam signals, and his instruments, just as in a real plane.

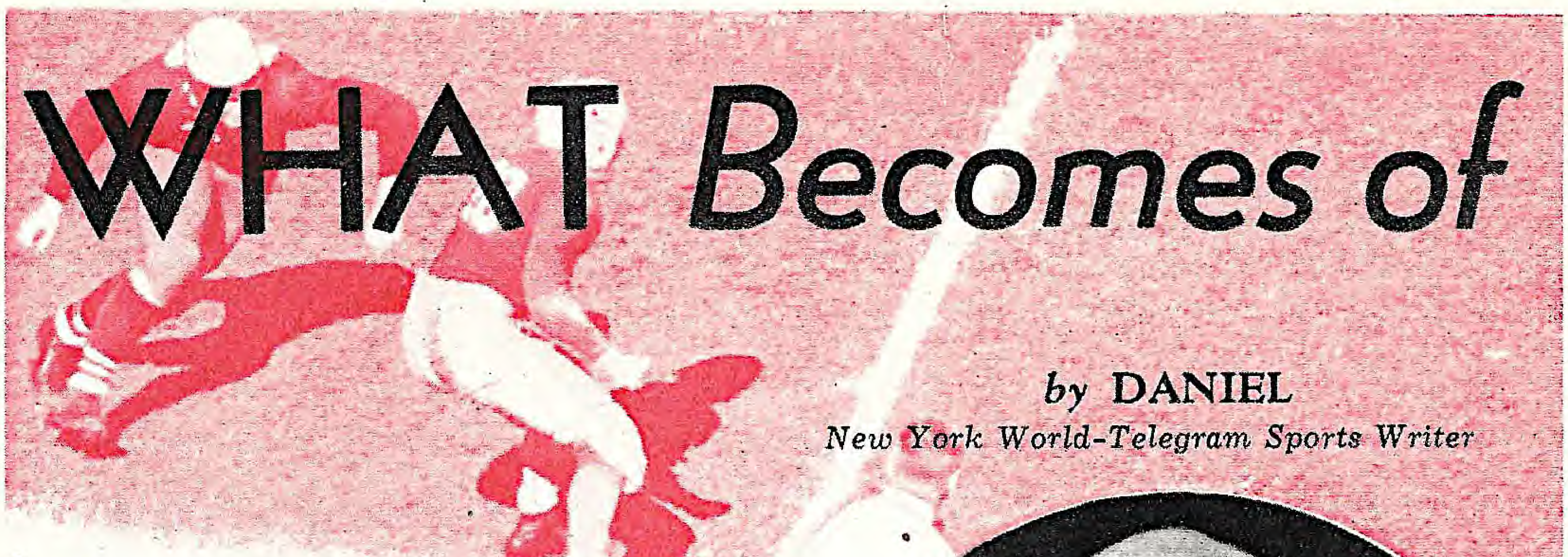
Engineer Develops Smallest Diesel

THE smallest and lightest Diesel engines in the world have been built by H. H. Turner, a Beloit, Wisconsin, research engineer. The smallest develops 1/100th horsepower and weighs less than 8/10ths of an ounce.

The tiny motors are started by a twist of the fly wheel which creates a relatively high compression within the cylinder and ignites the fuel. Timing of the ignition is controlled by the leanness of the mixture and the fuel oil is fed by an asbestos wick.

Left—H. H. Turner, engineer, built these tiny Diesels. Compare size with matchbox. Below—Engines have 10 parts.



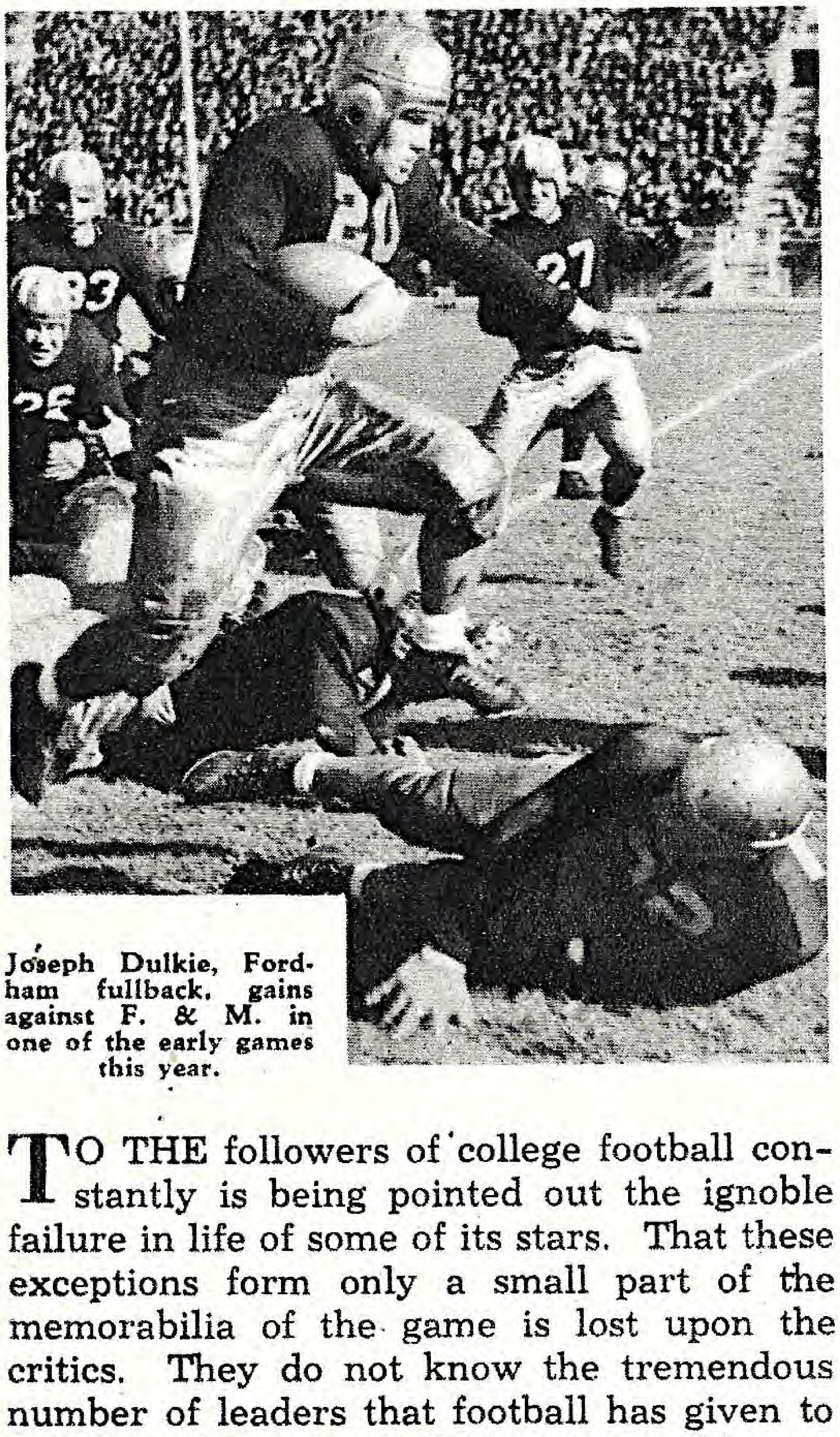


WHAT Becomes of

by DANIEL

New York World-Telegram Sports Writer

Col. John Reed Kilpatrick is a football player whose fame did not end with his graduation. A 1909 All-American end at Yale, he now directs Madison Square Garden, America's greatest indoor arena.



Joseph Dulkie, Fordham fullback, gains against F. & M. in one of the early games this year.

TO THE followers of college football constantly is being pointed out the ignoble failure in life of some of its stars. That these exceptions form only a small part of the memorabilia of the game is lost upon the critics. They do not know the tremendous number of leaders that football has given to American life. Football, the contest of brawn and brain, does breed manhood and character. As some old coach once said: "There are no knocks in life that frighten a man who has had to take it in football."

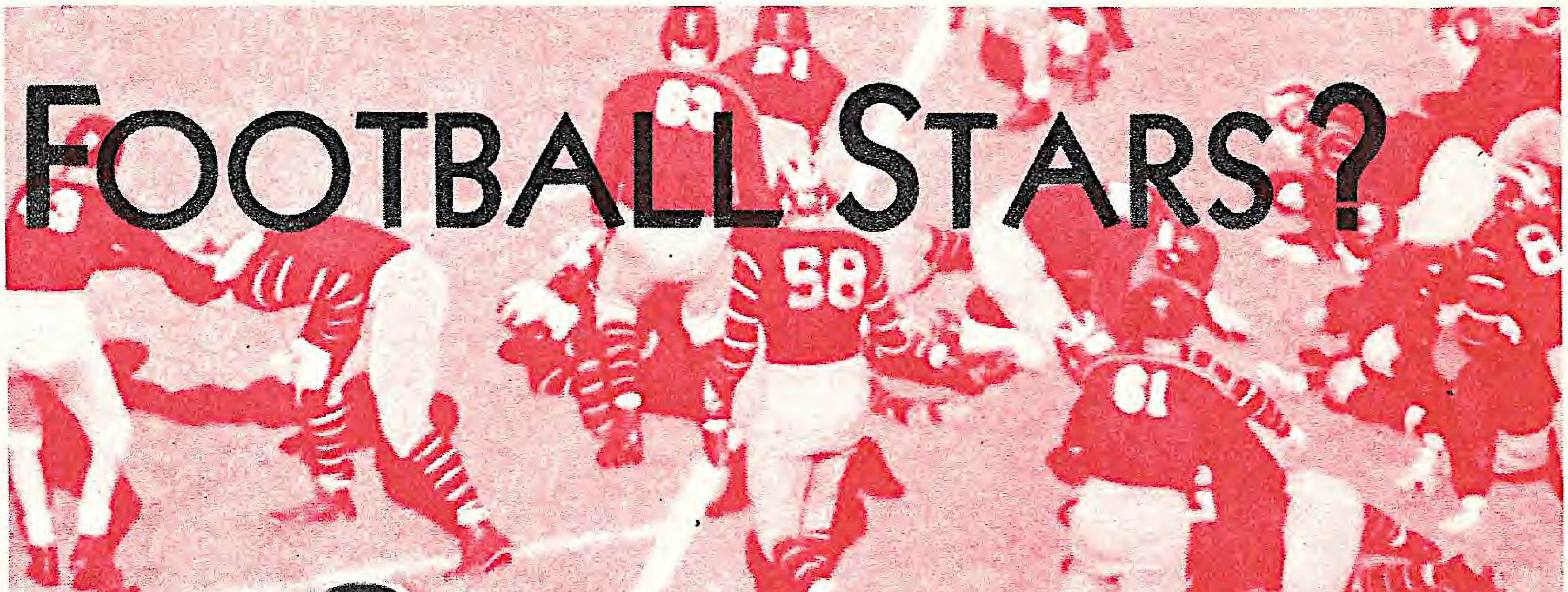
The three principal candidates for President this year are former football players. Franklin D. Roosevelt was a gangling lineman at Groton. Alf M. Landon played at Kansas. Though William Lemke weighed but 150 pounds in a day of giant players, he was guard and captain of the 1902 North Dakota eleven. All of the Roosevelt sons played at Groton and Landon gives up lots of Saturdays to watch Kansas.

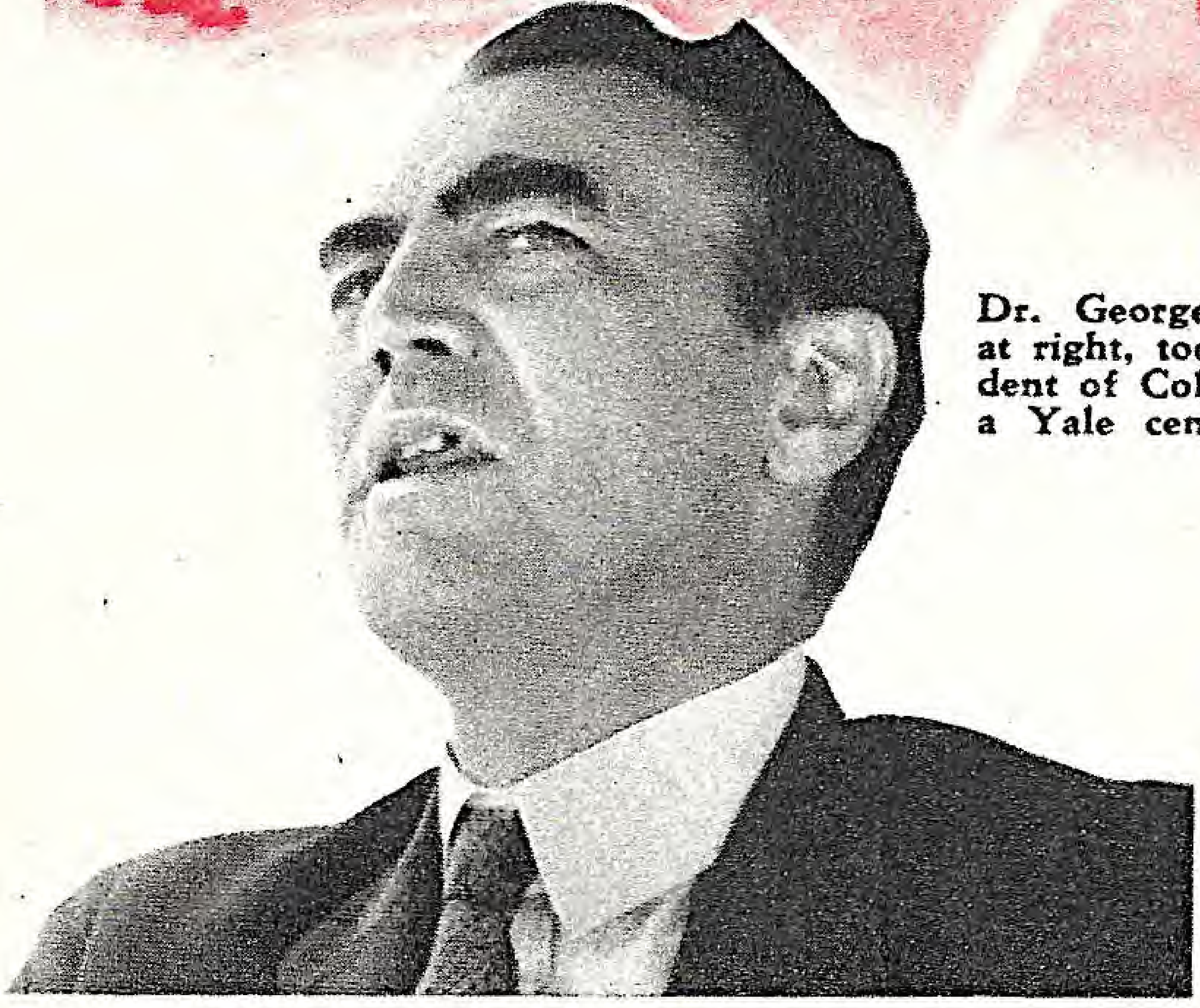
They tell a yarn about Landon and William Hayward, former United States Attorney General in New York City, anent the former's football interest. The two met on Landon's campaign train and began to talk football.

Their discussion ranged all over the country but inevitably it returned to the rivalry between Hayward's old school, Nebraska, for which he played half-back, and Kansas. Apparently the edge has rested with Nebraska because when Hayward asked Landon what his first move would be, if elected, Alf replied: "Call out the United States Army, Marine Corps and Navy and lick that damn Nebraska football team!"

Football's contacts are world-girdling. Henderson E. Van Surdam, secretary of the New York Touchdown Club, an organization of ex-college players who meet weekly dur-

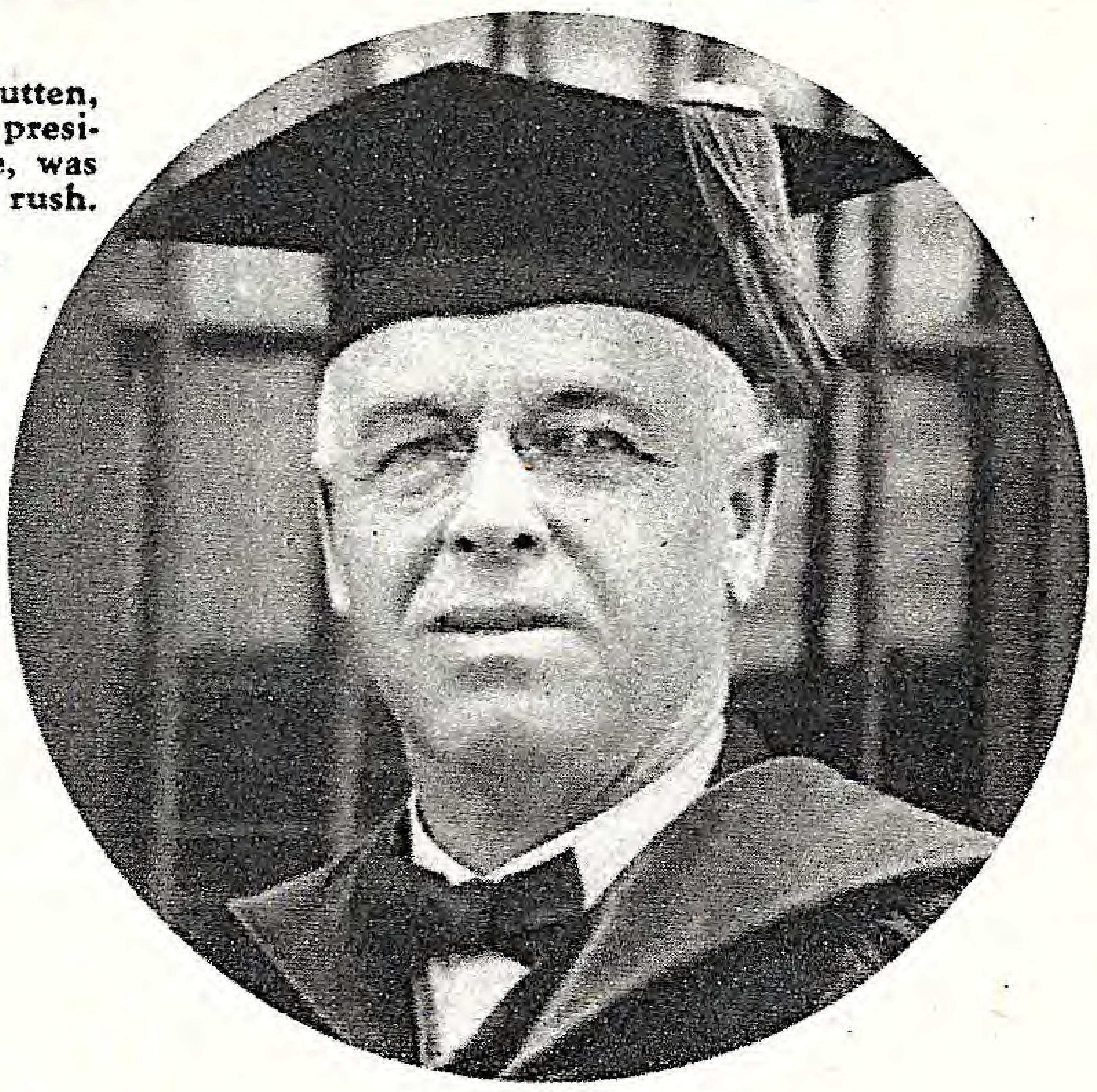
FOOTBALL STARS?





Representative Hamilton Fish, Jr., was one of Harvard's great linemen and captained the 1910 team. He ascribes much of his success to football.

Dr. George Cutten, at right, today president of Colgate, was a Yale center rush.



ing the season, describes an incident in Shanghai. Van Surdam at the time was introducing an American jazz band to the Orient.

Van Surdam, who was an all-New England quarterback at Wesleyan and later coached at four colleges, including Sewanee, suddenly came upon a familiar face while threading one of the narrow streets. "Remember me?" this person popped. The ex-coach hesitated. "Yes," he blurted, " I know you. You are 'Chigger' Brown, my 125-pound back from Sewanee, team of 1908." Van Surdam was correct in every detail. The ex-lightweight told his story. He had come to the East some years before as a trader. Later he had become interested in the egg business, exporting millions to the United States and Canada. He was quite comfortably situated and happy to remain in Shanghai. Van Surdam's career is a distinctive and successful one. He has been all of seven characters: musician, football coach, official, writer, music composer, glee club leader and cruise director.

When "Viva Villa!" was being shouted south of the Rio Grande Van Surdam was conducting El Paso Military Institute at El Paso, Texas. Border troubles hit the enrollment so severely that he was compelled to close the school. Not long after he founded the Texas School of Mines. The original enrollment was 70. Today its student body totals 700. It plays football and has a worthy reputation.

Drop in to a meeting of the Touchdown Club and you'll realize the quality of sound, successful citizens developed by football.

You'll see Ed Garbisch, All-American center in 1924 who played eight brilliant years of college football, four at Washington and Jefferson and four at West Point. Garbisch, firm believer in the efficacy of prayer, led his teammates in devotion before major games and it worked. Garbisch today is vice president of an important advertising agency, J. Sterling Getchell, Inc.

Next probably you'll encounter Dr. Francis

Thomas Cochran, left, a Morgan partner, played for Yale while Vance McCormick, above, Harrisburg publisher, was captain. A Notre Dame-Carnegie Tech play is shown at the right.

Glazebrook, Trinity College quarterback of 1896 and a leading New York physician.

Frequently there is present a powerfully-built chap, Hamilton Fish, Jr., one of Harvard's greatest linemen and captain in 1910. Fish is a member of the House of Representatives from Dutchess County. Descendant of an old American family, he insists that football fitted him for his career. "It taught me to go all out in anything I attempt," he said, "and it taught me the essential equality of all men."

It was Fish who introduced the Zionist Revolution into Congress commending the British government for undertaking the mandate of Palestine as a National Homeland for Jews. During the World War he commanded a detachment of Negro enlisted men and was promoted major for gallantry.

The Touchdown Club session may bring you into contact with Harry Stevens Hammond, University of Michigan end in 1907 who has made equally fine a record in business. Hammond, who was an executive of the Pressed Steel Car Company, now holds a similar position with National Tube.

Ed Hart, Princeton '11, an all-around gridman who performed equally well at halfback or tackle, will be there. Hart, after many years as a real estate operator in Chicago, currently is with Johnson and Higgins, New York Stock Exchange firm. Perhaps you'd find W. E. Sprackling, Brown '11, elusive ball-carrier of the same era whose feats against the Carlisle Indians are legend. Sprackling's progress has brought him a high position with Anaconda Wire and Cable Company.

Regular attendants at the session include Herman Suter, Princeton quarter and halfback in 1898; George Pfann, Cornell's All-American quarterback in 1923, and Elmer Oliphant, All-American halfback of Purdue and Army, '17 and '21.

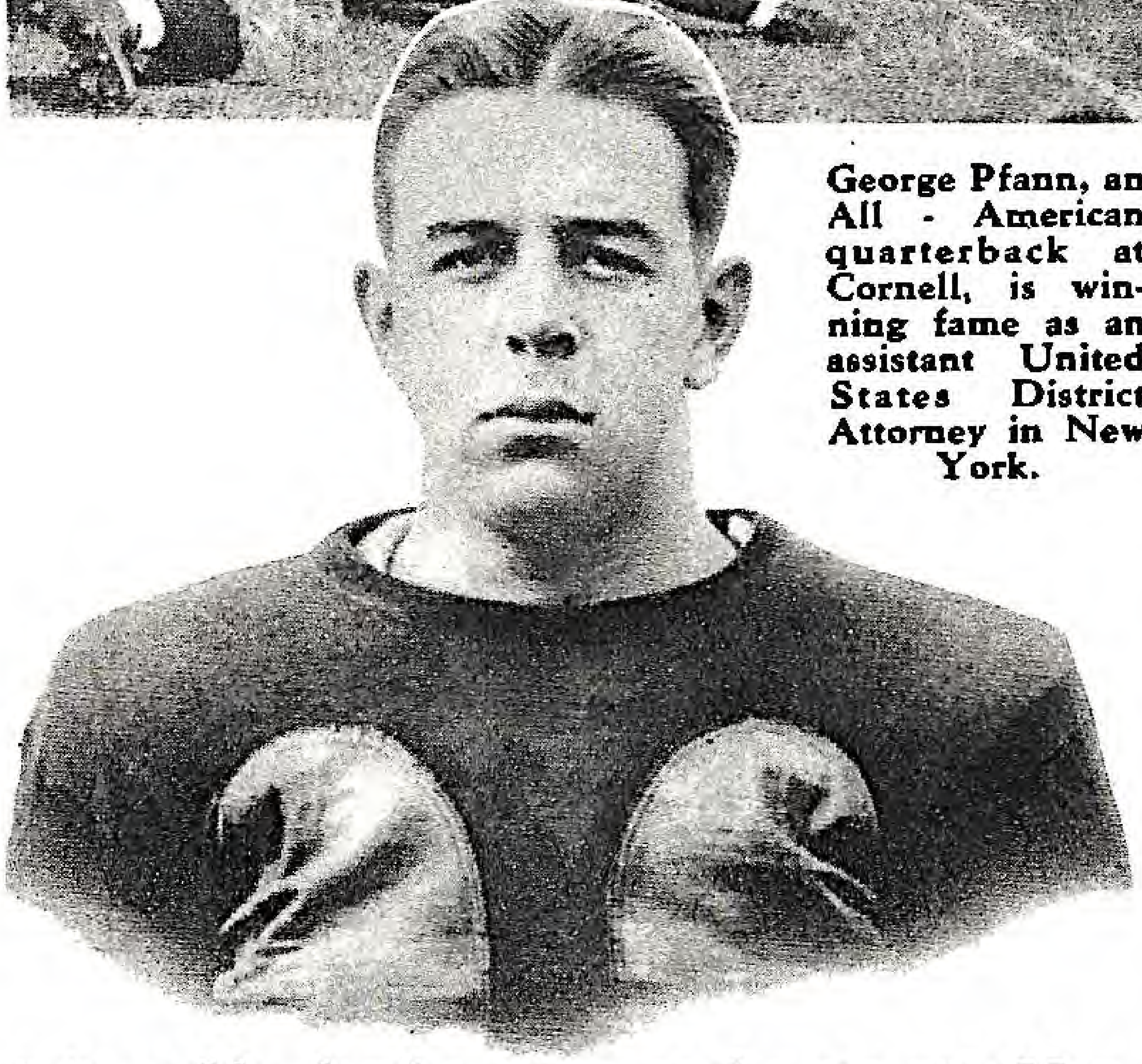
Suter, member of the firm of Palmer, Suter and Palmer, operators of newspaper properties, jumped from a player to coaching eminence in one year. In 1899 Suter went south and became coach at Sewanee. His team there was known as the Sewanee Iron Men because it performed a feat never recorded before or since—capturing six games in six days.

Pfann, a Phi Beta Kappa at Cornell, has evinced All-America brain-power in the law courts and is a member of the staff of the United States attorney in New York. In the fall he coaches football at Swarthmore College where Dr. Francis Aydelotte, University of Indiana end in 1899, is president. Oliphant, proclaimed by many as one of the hardest as well as trickiest runners in football, is a leading figure in insurance in New York.

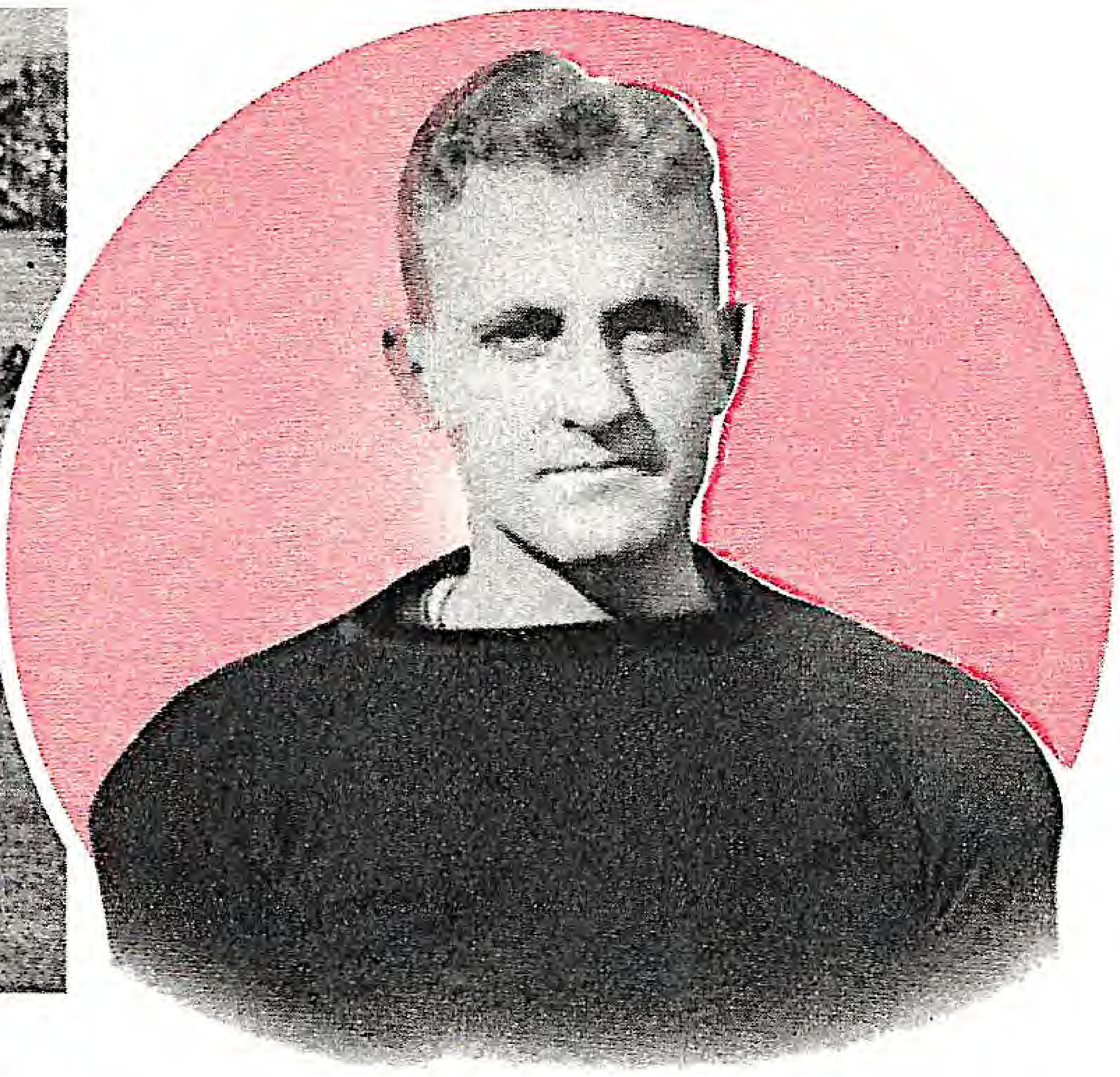
Chums in college, law partners and fellow enthusiasts of the Touchdown Club are Fred Murphy and David Fultz, end and halfback at Brown, '98 and '97. Murphy is vice president of the club. The president is Dr. Albert Sharpe, star Yale halfback of 1899 and 1900. Dr. Sharpe, for several years directed the Ithaca School of Physical Education and today is a field executive of the Red Cross.

Similarly interested parties are William S. Langford, Trinity fullback of 1895, and C. Everett Bacon, Wesleyan '12, quarterback and an All-American. Langford is a partner in the insurance brokerage firm of March and McLennon, while Bacon is with the stock brokers, Spencer, Trask and Co.

Few are more constant in loyalty to the club than Arthur French, '28 Harvard cap-



George Pfann, an All-American quarterback at Cornell, is winning fame as an assistant United States District Attorney in New York.



Ed Garbisch, an All-American center for Army, is now vice president of the J. Sterling Getchell, Inc., advertising agency.

tain and back who manages the gigantic Manhattan Beach resort in New York. Of similar attitude is Ed Wittmer, Princeton halfback under the late Bill Roper and head coach for a year after the death of his tutor. Wittmer today is head of his own firm, Ed Wittmer Co., general insurance.

Dean Hill, Georgia Tech hero of 1910, who captained that team and played end, takes in meetings when his work as one of the chiefs of the Mercerizers Association of America permits. H. R. Rider, Princeton halfback in 1896, makes trips from Lehigh, where he is a professor of physical education.

Every old football star expresses a debt of gratitude to the game but Big Bill Edwards, physical giant with a public reputation commensurate with his size who is a member of the Touchdown Club, wryly points out that the sport has done him one dis-service.

Edwards, former Collector of the Port of New York and regular Princeton guard through '97, '98 and '99 and proclaimed an all-time All-American, declares that "my football record has dogged me too long."

But it isn't easy to forget a record such as Bill's. From the first year he played for Lawrenceville School and on into Princeton his strength and amazing consistency were bywords.

Ten years ago Big Bill re-established direct contact with football when he was elected president of the American Professional Football League, organized in opposition to the National Football League. He was voted a salary of $25,000 a year for three seasons but the league did not last beyond one year.

When the Senate and House of Representatives resume deliberations two ex-football stars—ex-college mates, too—will be working as a team to put over a favorite piece of legislation, the Frazier-Lemke Farm Bill.

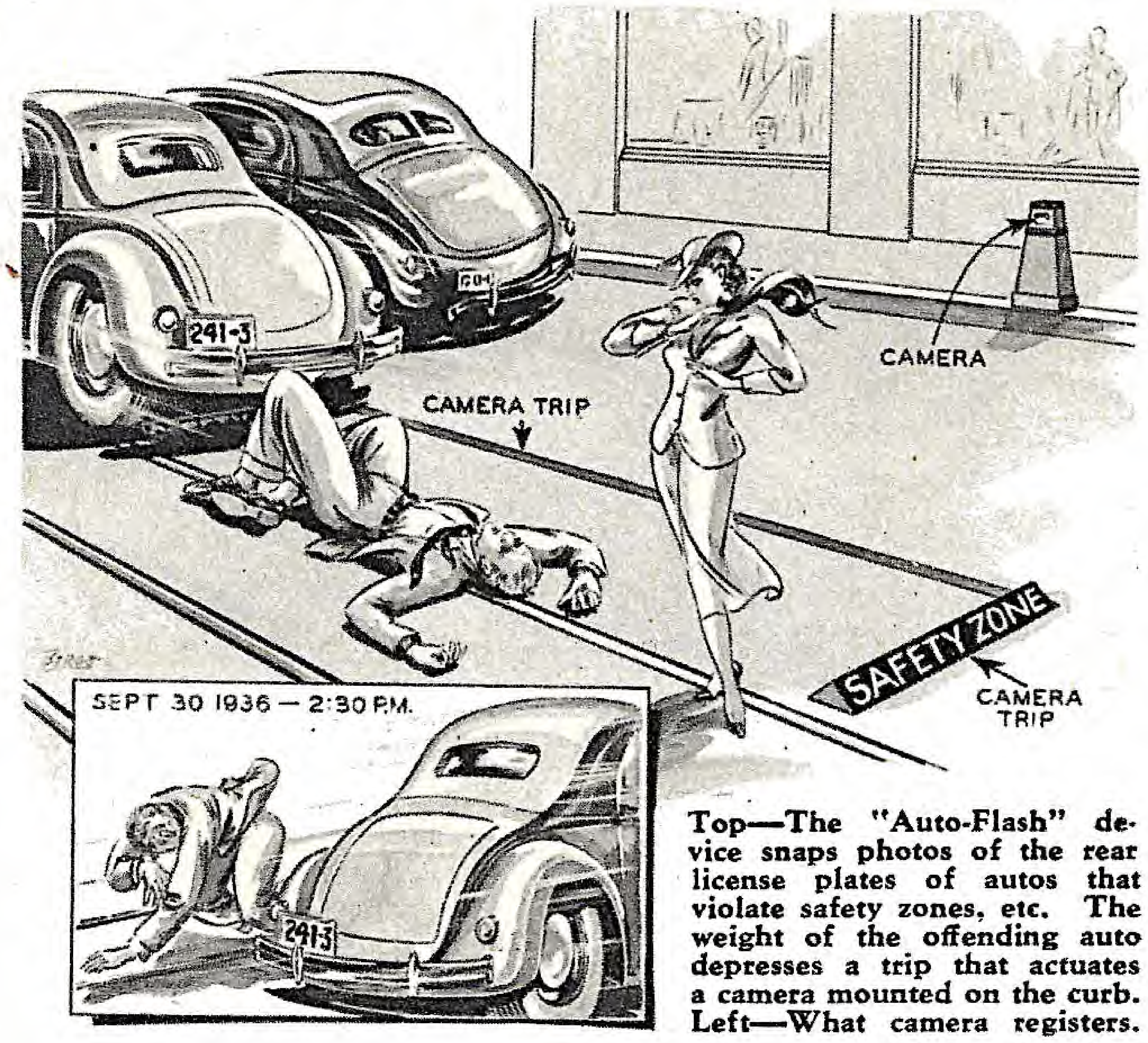
Lynn Frazier and William Lemke are North Dakotans, both born and raised on farms. Frazier came to the University of North Dakota in 1897, a solid youth with powerful legs and shoulders. He was placed at center and did so well as a sophomore that he was elected captain in his junior year. The 1899 Nodaks compiled an incredible record, winning every game and allowing all opponents only six points.

Lemke, who scarcely weighed 150 pounds and came into the Nodak lineup just as Frazier was about to leave, was one of the original watch-fob guards. Football still was the game of smashing, killing power in 1900 and little Lemke absorbed beating after beating from linemen who practically carried ball-carriers on center rushes.

Football claims an important part in the career of Vance Criswell McCormick, former

[*Continued on page* 166]

"Hit-And-Run" Victim Devises Camera Trap For Motorists



Top—The "Auto-Flash" device snaps photos of the rear license plates of autos that violate safety zones, etc. The weight of the offending auto depresses a trip that actuates a camera mounted on the curb. Left—What camera registers.

AN AUTO-FLASH device designed to snap photos of autos that run past red lights, into safety zones, and past stop streets, has been invented by William Running, a Detroit, Mich., electrician. A personal experience as a "hit-and-run" victim caused him to design the device.

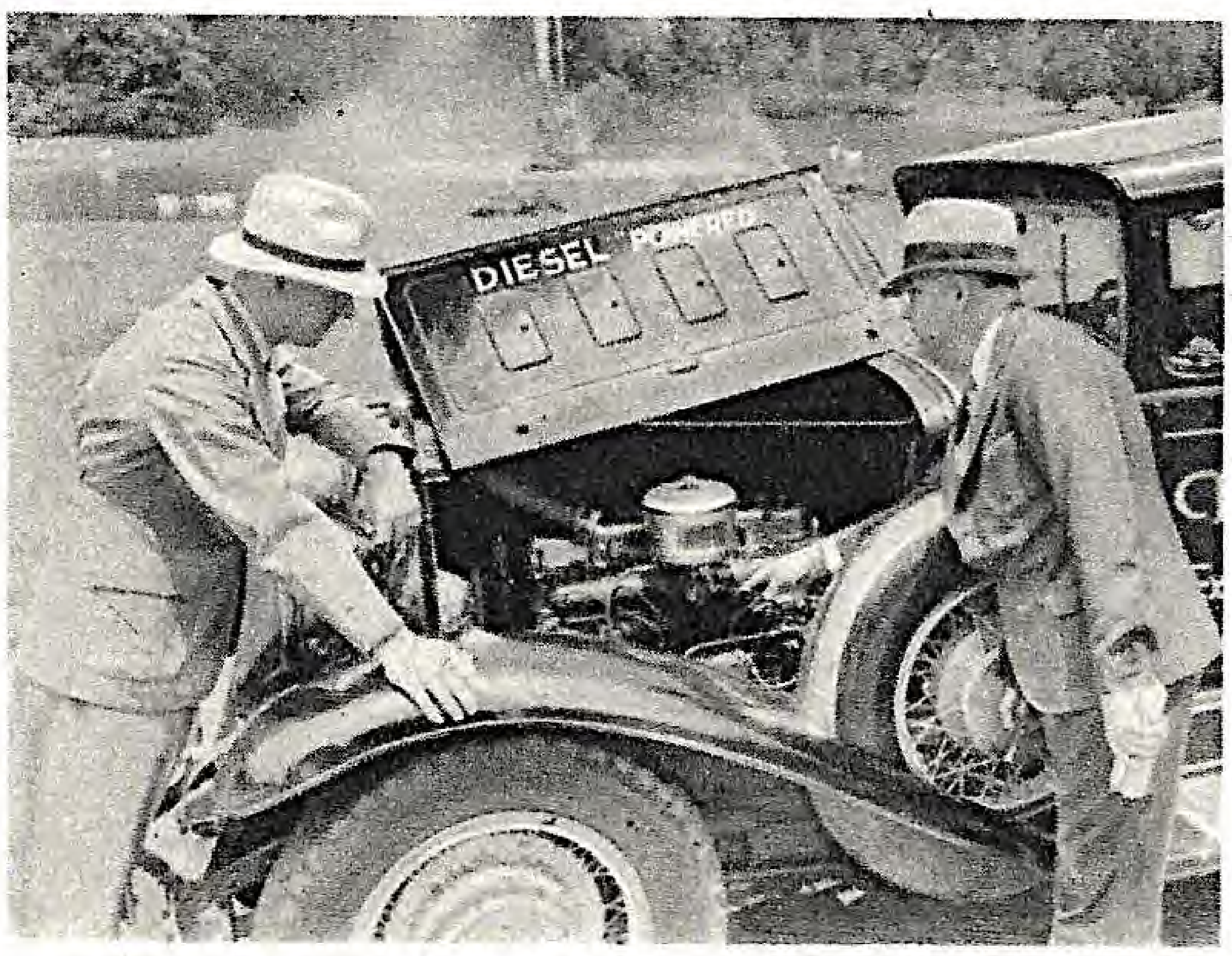
For safety zones, the machine consists of a lighted sign set in the pavement which depresses when an auto passes over it. This actuates a camera set up on the curb so that it snaps a photo of the rear license plates of the offending auto.

At intersections and stop streets, a special trip set in the pavement actuates a camera when the offending car passes a red light, or stop sign, without stopping. Camera also records the time of violation so that the photographic record can be used as evidence in court.

Auto Run By Small Diesel Motor

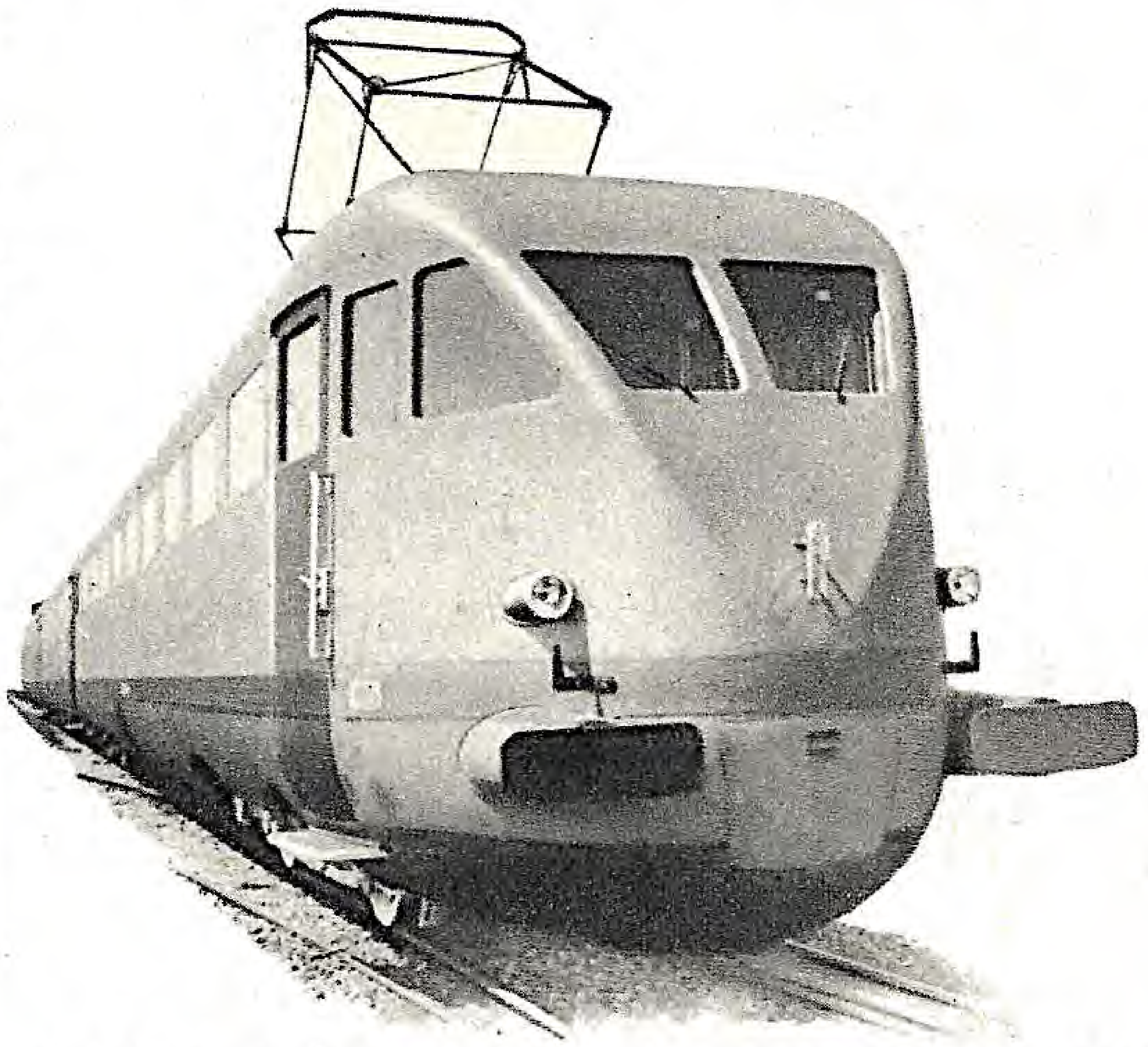
THE smallest six-cylinder Diesel engine built in America has been installed in a regular passenger automobile. In tests, it ran the auto for 280 miles for 54 cents, approximately 1/10 the cost of driving the same distance in a gasoline powered car.

The engine as installed by Ralph Hemphill, Pacific Coast Diesel authority, develops 79 h.p. at 2,600 r.p.m. Its cubic displacement is 260 inches, which is slightly higher than that of a standard six-cylinder gasoline auto engine. Regular Diesel oil fuel was used, and mileage averaged 30 miles per gallon.



Ralph Hemphill, noted Diesel engine expert, and his assistant, H. B. Harms, examine the smallest six cylinder Diesel engine built in America and installed in a passenger automobile.

New Italian Trains Go 99 M.P.H.



Italy is developing modern trains for use on her railways. This new type engine can travel at 99 m. p. h. Its air conditioned cars provide many conveniences. Photo by Agenzia D'Italia.

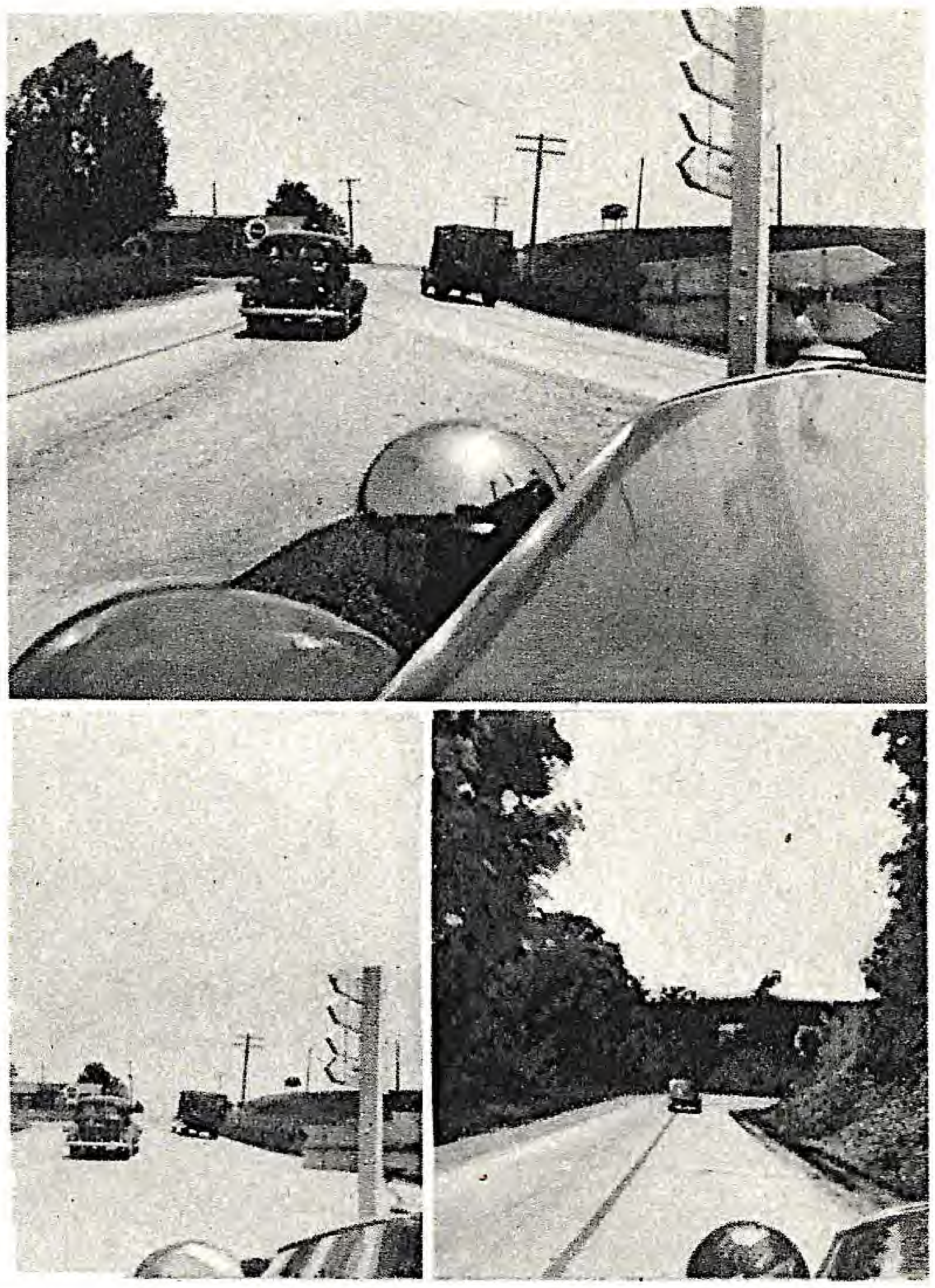
FIRST-CLASS trains capable of speeds up to 99 m.p.h., and featuring many conveniences for passengers have been developed by the Italian Government. The cars are air conditioned throughout. The new trains are 205 ft. long, 9¾ ft. wide, and 12½ ft. high.

Triple Lens Windshield Camera Spots Traffic Violations

MOUNTED on the windshield, a new triple lens camera, operated without diverting the driver's eyes from the road, records three distinct views of traffic violations encountered while driving. The camera also records the time and date when used and the film shifts automatically for the next picture.

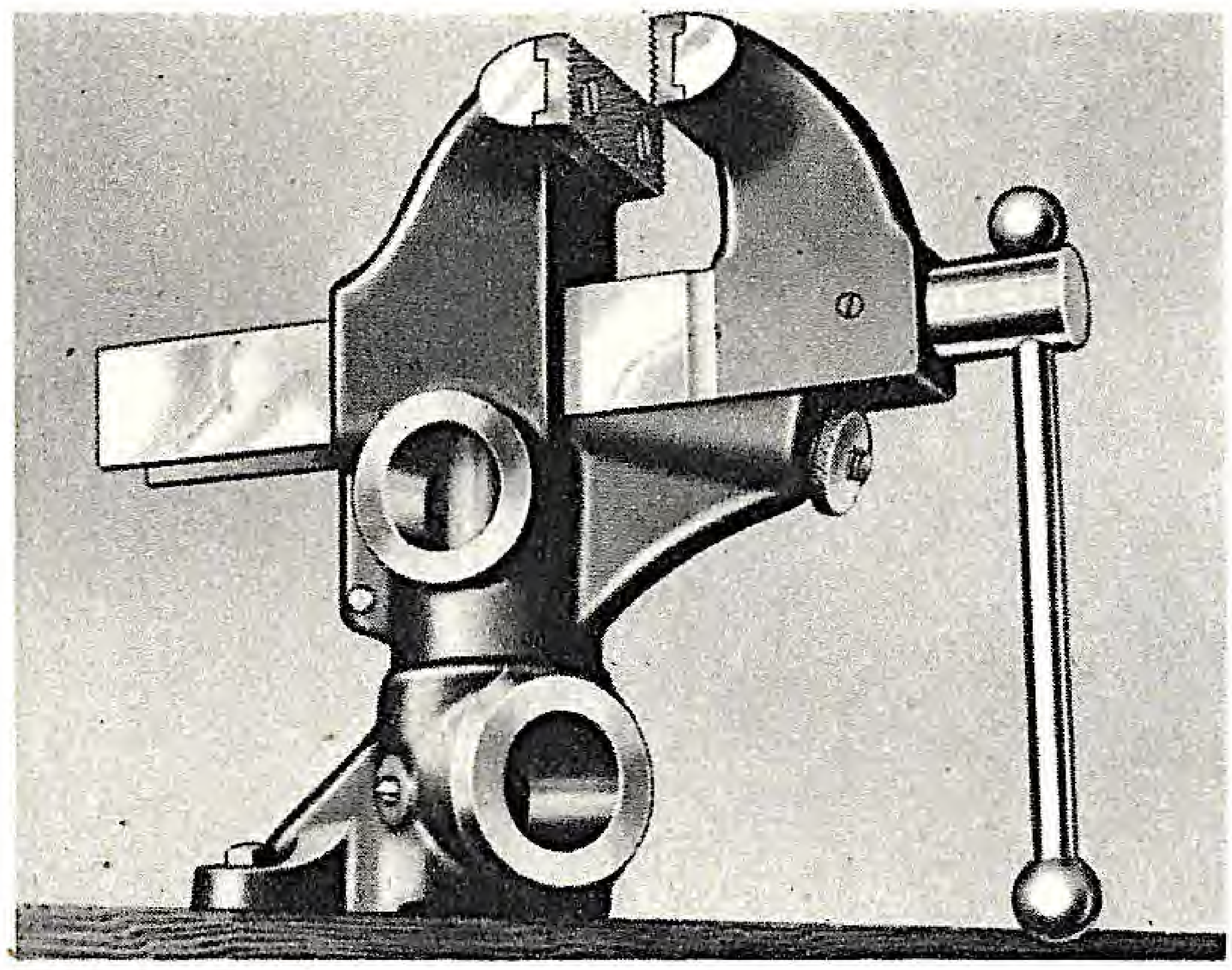
One of the views taken by the camera is a large one showing the car of the violator in its relationship to other cars, pedestrians, traffic lanes, etc. The smaller views give a close-up of the car from which the license plate number can be ascertained.

The inventor, H. C. Fairchild, of Washington, D. C., proposes adoption of the camera by the police authorities as a means of reducing the flagrant violations of traffic regulations by having volunteer observers mount the cameras on their cars. Photographs could be sent to state motor vehicle bureaus where warnings or fines could be issued.



Mounted on the windshield, a new triple lens camera takes, dates, and times three photos of traffic violations. Top—Large view as taken by camera. Bottom—Smaller views.

Bench Vise Adjusts To Many Angles



This all-angle portable vise revolves on a tubular post and can be set at any angle in four different planes. It has removable hardened steel jaws, 2½ and 3½ inches in width.

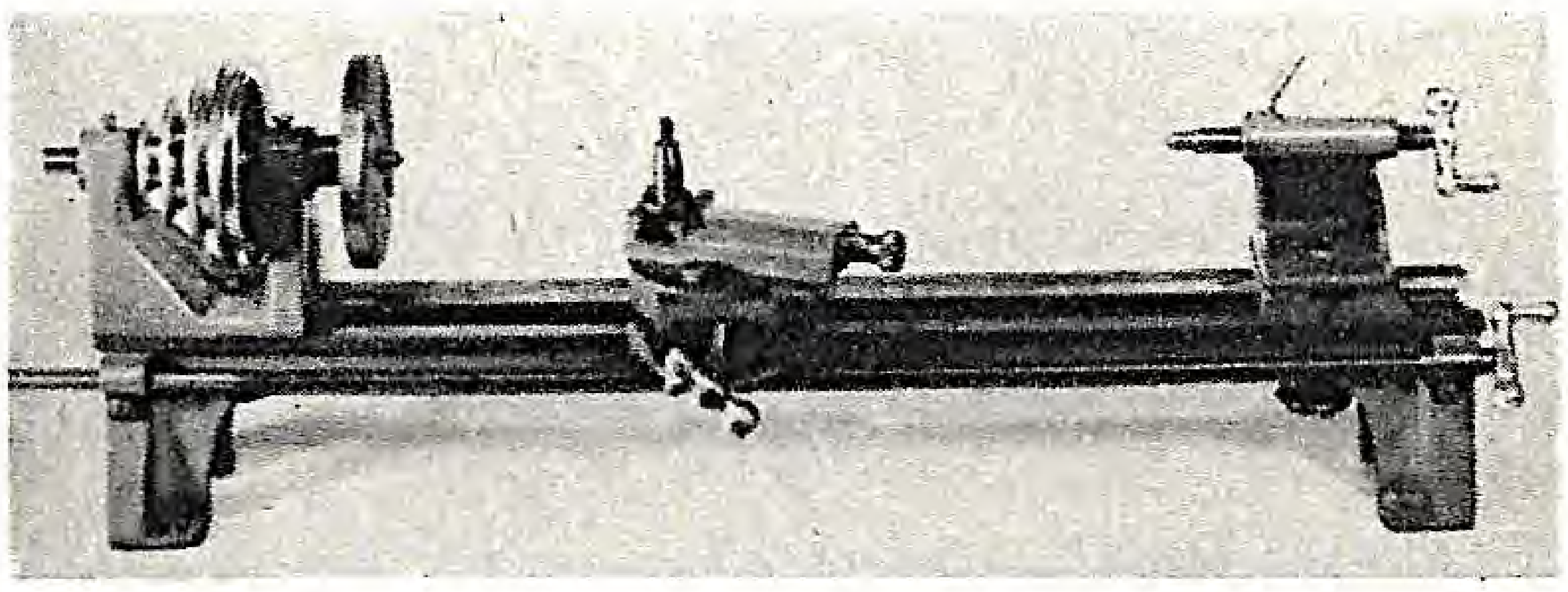
AN INGENIOUS bench vise developed by a Los Angeles, Calif., manufacturer, is made of accurately machined alloy steel castings and permits instantaneous locking of the work at any angle in any of four different planes. This is made possible by the use of a tubular post on which the vise revolves.

The post, secured in position by a pin, can be used in either a vertical or horizontal position, and the vise can be used straight up or sideways in either position of the post.

Lathe Features Extend Work Range

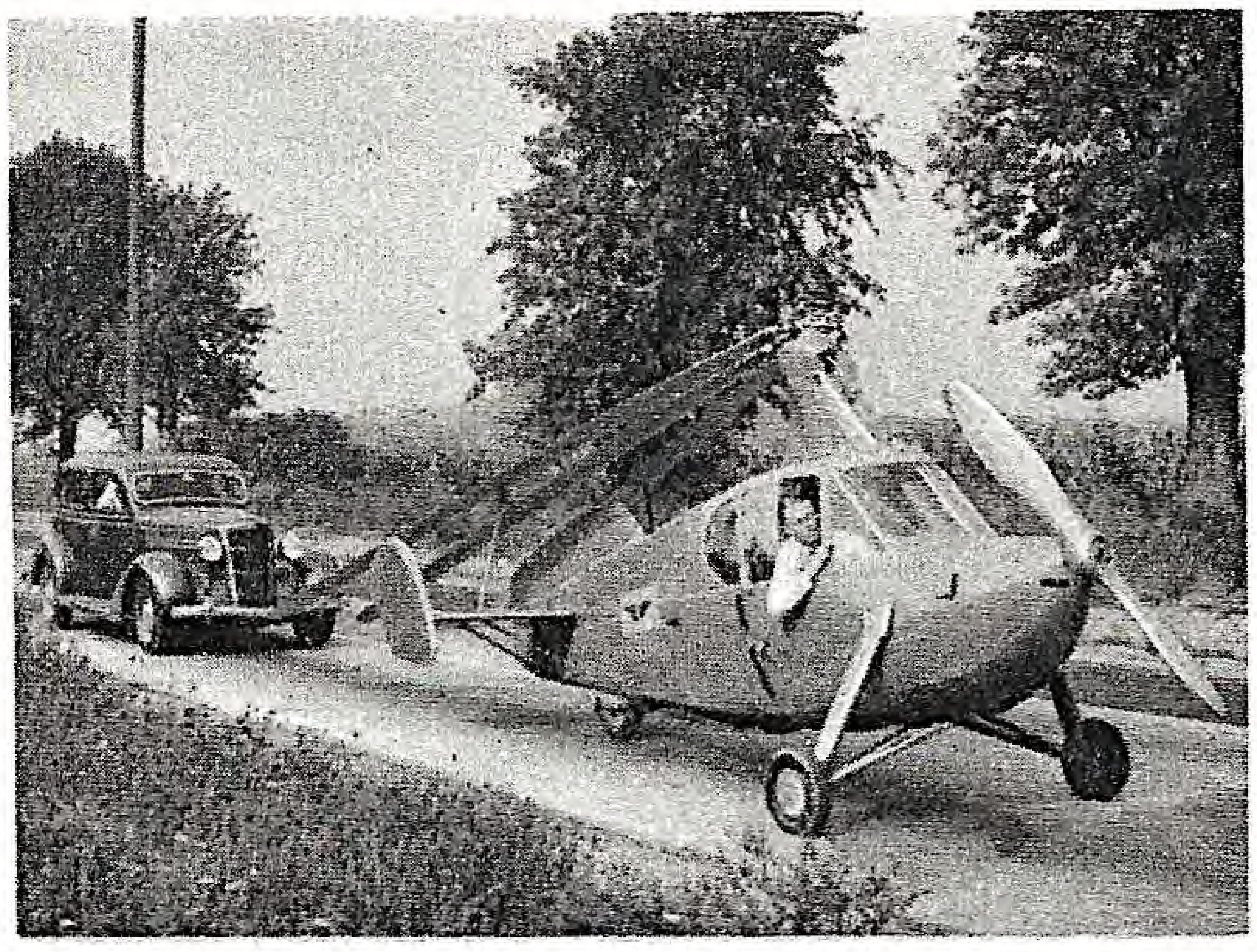
AN INEXPENSIVE metal-turning lathe incorporating unusual features has been developed by an Ann Arbor, Mich., firm. The new additional features broaden the scope of the work that can be handled.

Noteworthy features of the 30-pound lathe are—a transverse travel attachment for the Compound Carriage, with hand feed; a take-up bearing in the headstock; a side adjustment in the tailstock, making possible tapered cuts and assuring perfect alignment between centers; and an inner channel of ways beveled to a 45-degree angle, giving all the advantages of V-ways.



This 30-pound inexpensive metal-turning lathe has many unusual operating features. It swings work 6 inches in diameter and 18 inches between centers. Its overall length is 31 inches.

Autogiro Designed For Highway And Airway Operation



This new autogiro is designed for travel along the highways as well as the airways. It proved its practicability in a test before government officials at Washington, D. C.

THE aviation enthusiast's dream of a combination aircraft that could navigate both airways and highways has become a reality. The U. S. Bureau of Air Commerce has accepted delivery of the first autogiro designed for travel along the highways after a practical demonstration of its practicability.

The new type autogiro, designed and built by the Pitcairn Autogiro Co., of Philadelphia, Pa., was landed in a roped-off public square in Washington, D. C., by James Ray, pilot. The rotor blades that provide the autogiro's lifting ability were folded back, the propeller disengaged from the engine by means of a clutch, and the giro was then driven along the streets to the office of the Bureau of Air Commerce. The tail wheel is steerable.

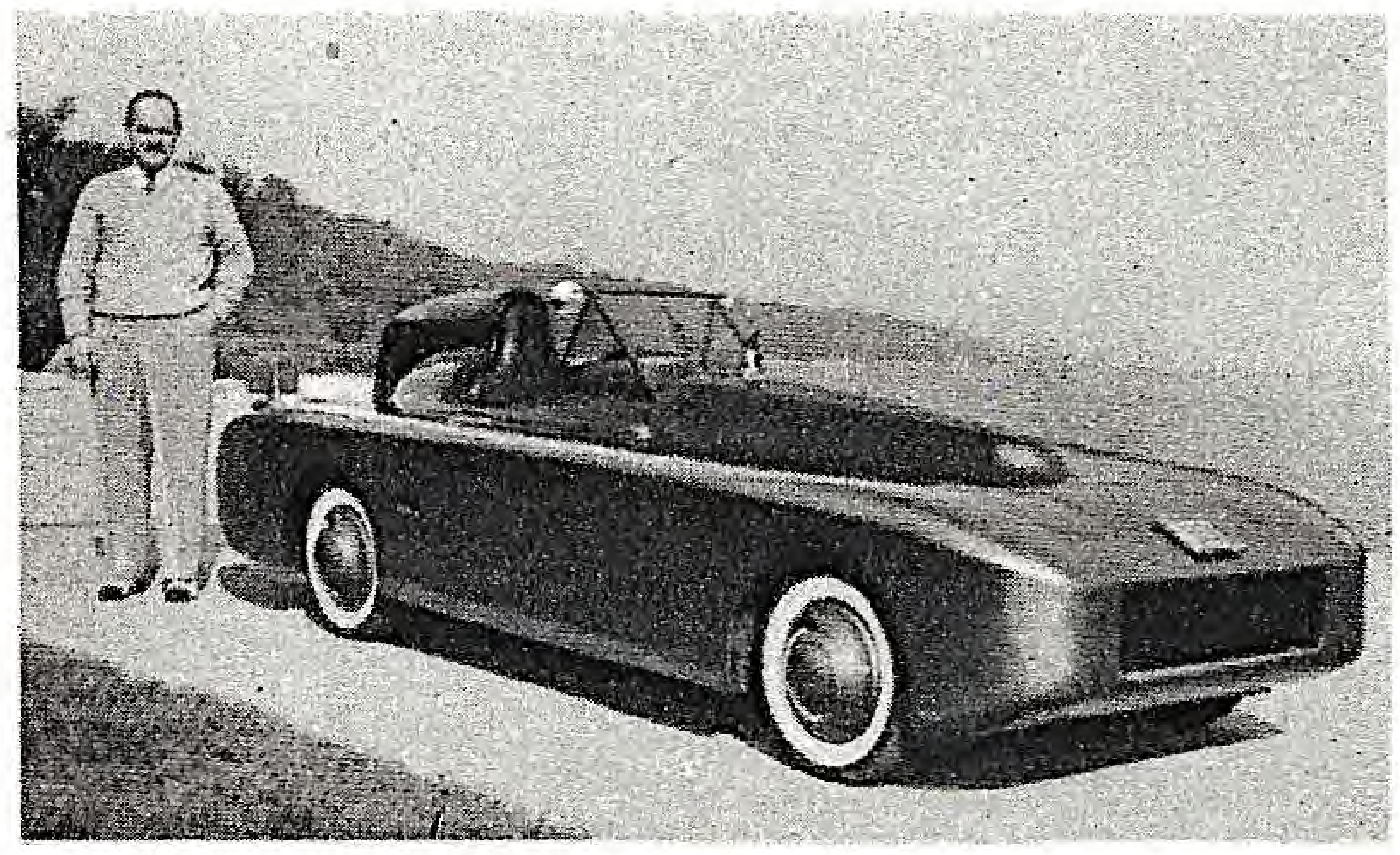
When the clutch that releases the propeller is actuated, it transmits the power of the engine to the landing wheels by gears.

Front Drive Auto Travels 110 m.p.h.

DESIGNED to serve as an example of artistic and functional design as well as mechanical ability, a newly developed auto attains a speed of 110 m.p.h., and is said to travel 30 miles on a gallon of gasoline. It was designed by Benjamin F. Harris III, an industrial engineer in Chicago, Ill.

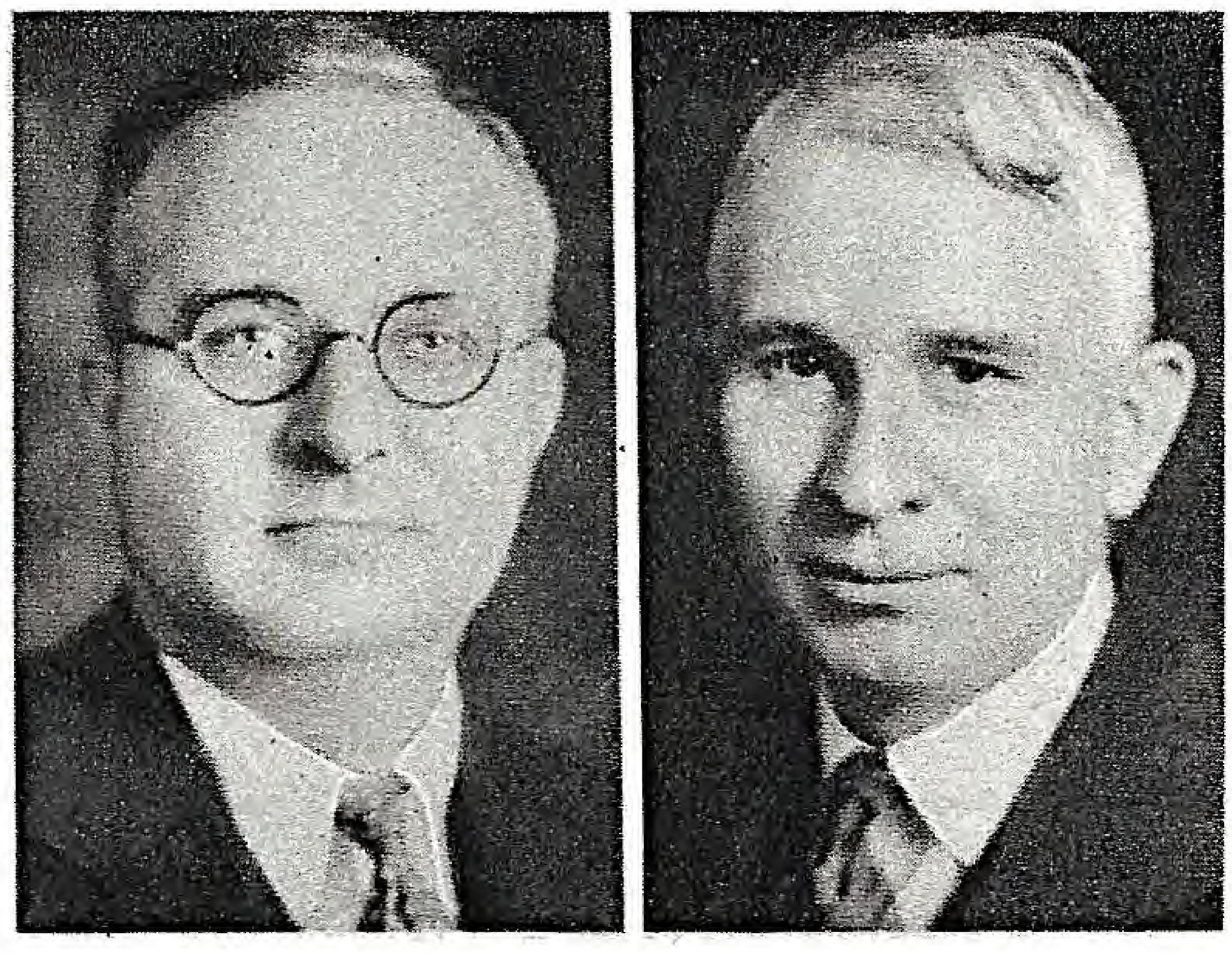
Three years time was required to construct the car which incorporates many novel features. It is equipped with a front drive transmission and has independently sprung rear wheels. Fully retractable headlights and an exhaust aperture built into the body reduce air resistance.

The power plant is a specially built V-8, geared engine equipped with two carburetors. The auto weighs 1,500 pounds and is 12 feet long, 5 feet wide. With a wheel base of 86 inches, the wheel tread is 50 inches. The auto has remotely controlled filler caps and concealed hood latches and locks.



Benjamin F. Harris, of Chicago, Ill., and his front drive auto. It required three years to build and travels at speeds of 110 m.p.h. Spare wheel, tools, etc., are carried in body.

Chemical Society Honors Americans



For their outstanding achievements in the field of chemistry, Thomas Midgley, Jr. (left) and Dr. Walter S. Landis were awarded medals by the Society of Chemical Industry.

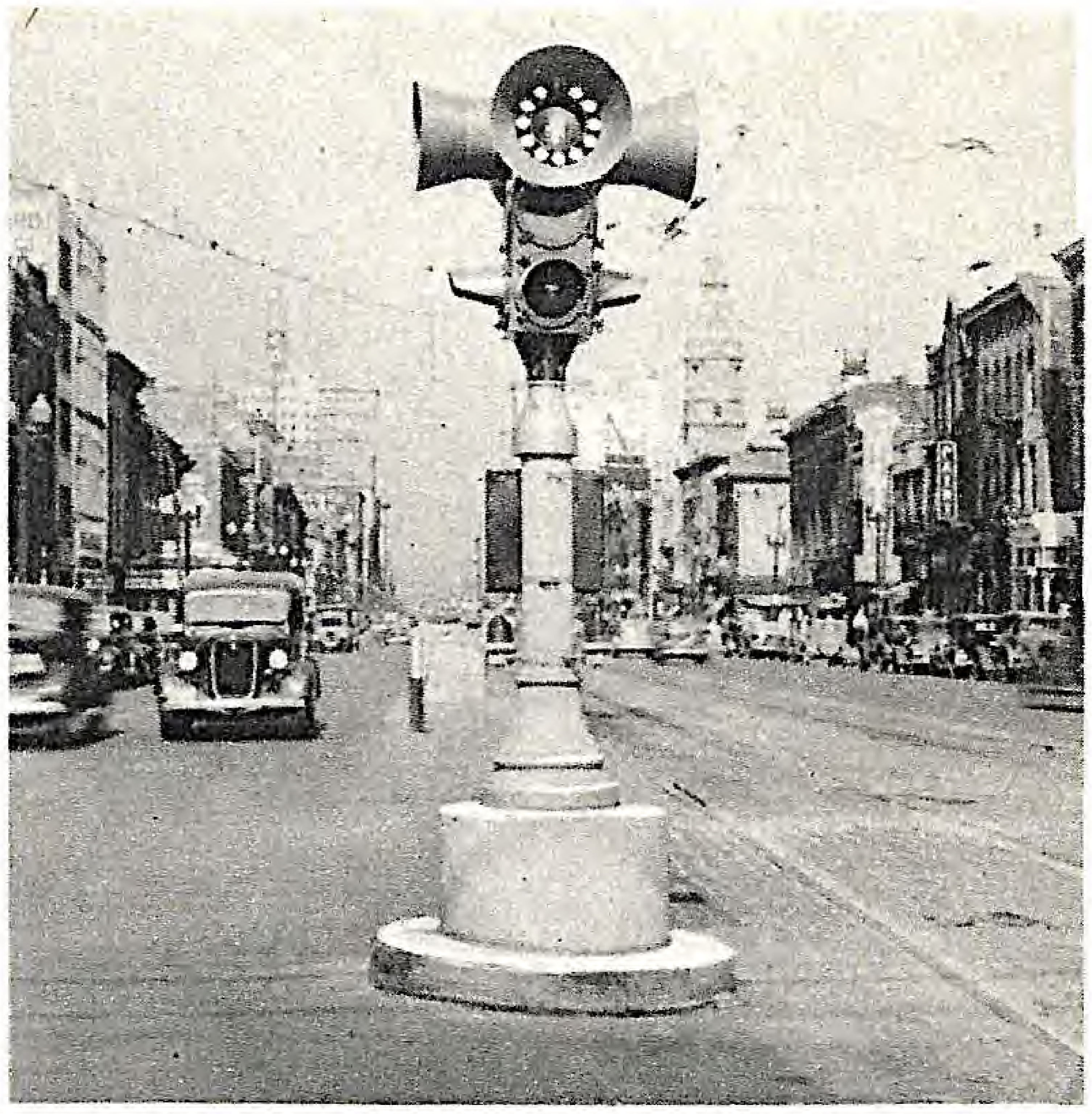
THE American Section of the Society of Chemical Industry has awarded medals to two outstanding American chemists. The men honored by the society are Dr. Walter S. Landis, vice president of the American Cyanamid Co., N. Y., and Thomas Midgley, Jr., vice president of the Ethyl Gasoline Corp., N. Y.

Dr. Landis received the Chemical Industry Medal for 1936 for his valuable application of research to the chemistry and economics of the fertilizer industry. Mr. Midgley was awarded the William H. Perkins Medal for his development of anti-knock motor fuel and safe refrigerants.

Doctor Develops Stop-And-Go Light To Reduce Accidents

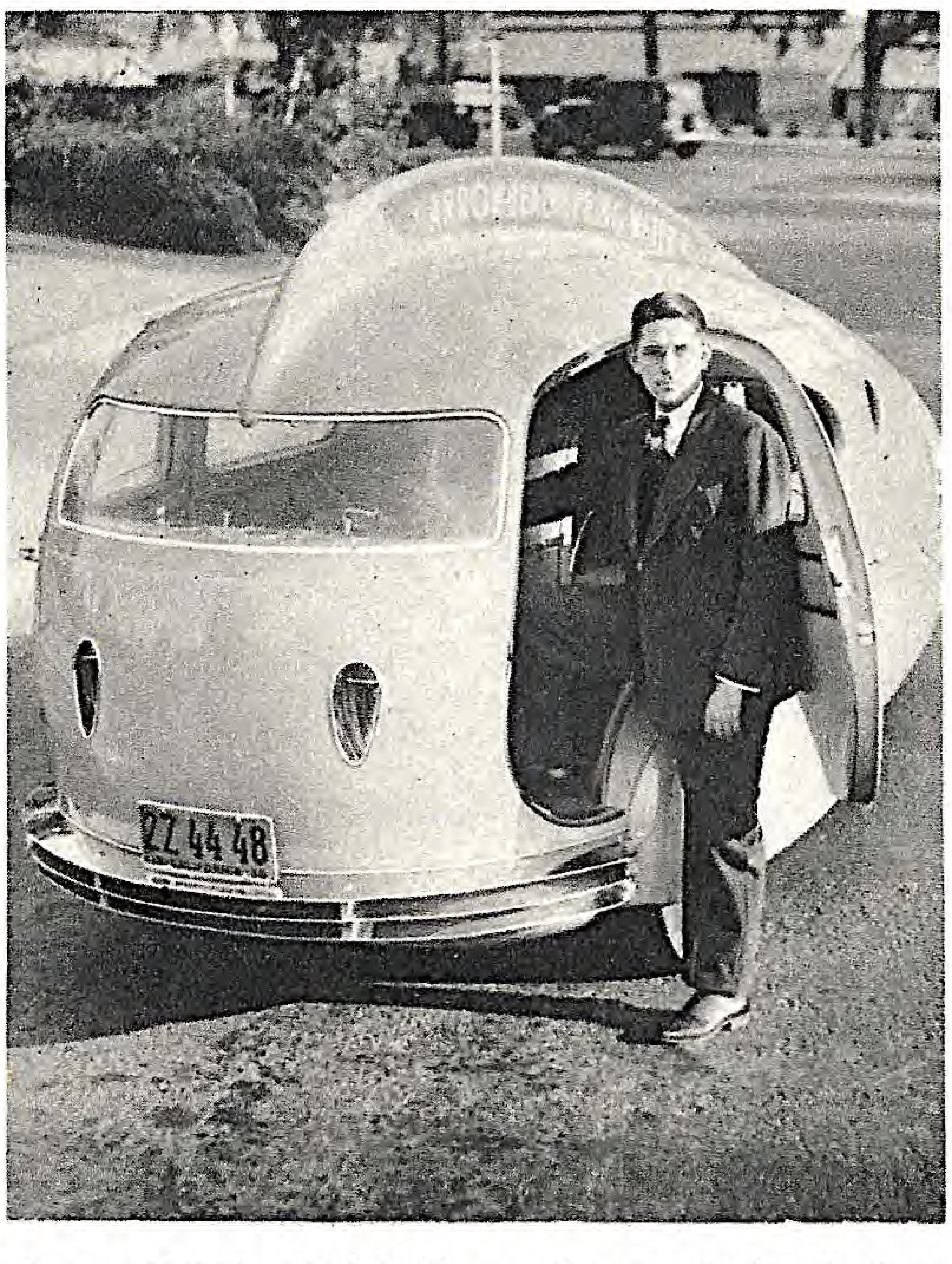
A NEW traffic signal light, invented by Dr. Walter E. Beyer, of Indianapolis, Ind., has reduced traffic accidents there. It serves to eliminate sudden stops and driving through red lights due to sudden light changes.

The signal light consists of small white bulbs set in a visor around the usual green light. These are lighted in rotation prior to a change of the light from green to red and give the approaching motorist an idea of how much time he has before the change will occur. The visor prevents motorists in the intersecting streets from seeing the white bulbs light, causing them to wait for the green light to appear.



Lighting in rotation, the white bulbs in the visor around this green traffic light inform the motorist how much time is left before green light will change. Bulbs each represent a second.

Tear Drop Design Applied To Auto



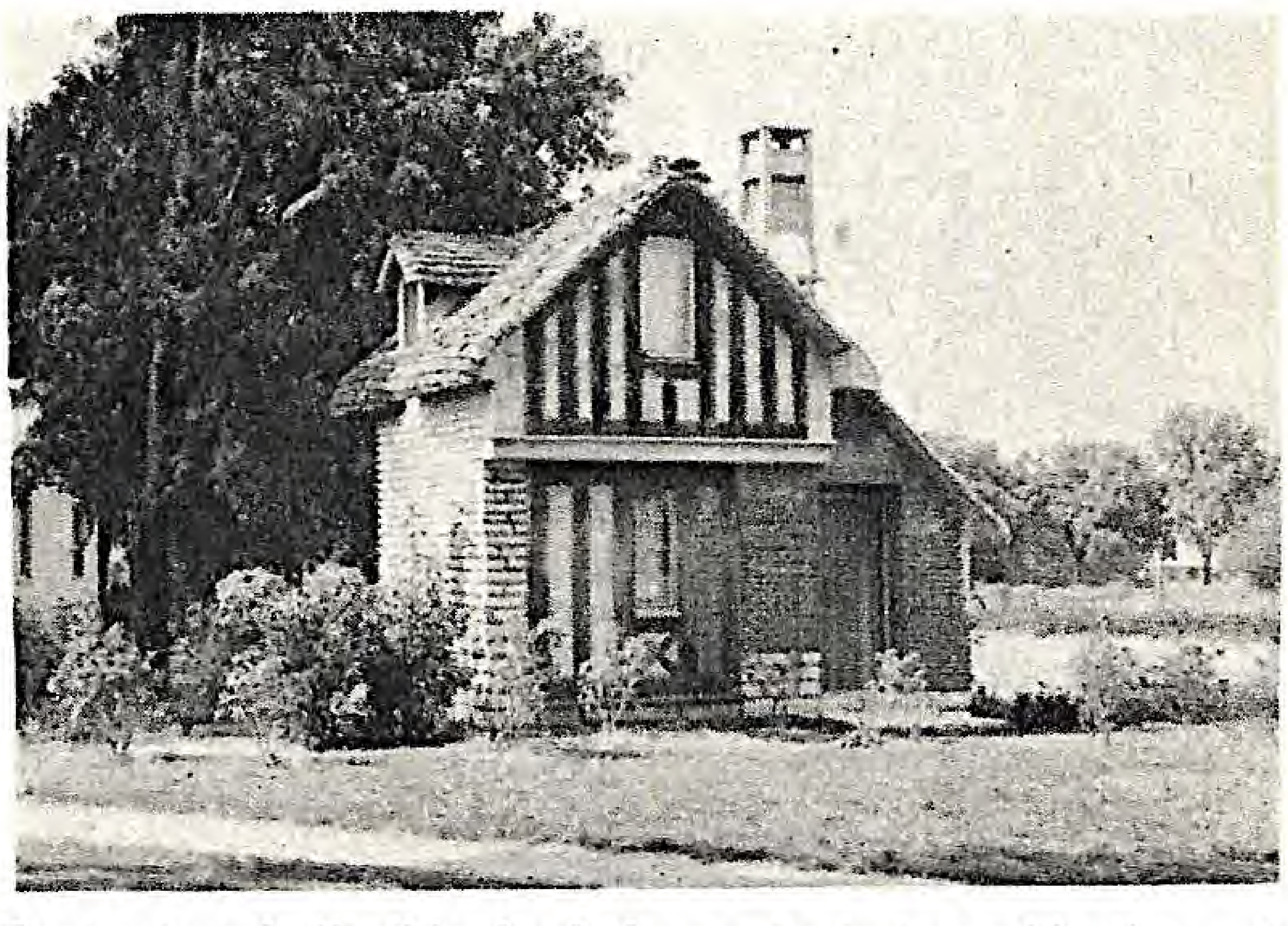
Costing $8,000 to build, this novel auto embodies the latest discoveries in streamlining. Designed by W. E. Miller, of Los Angeles, Calif., it carries three passengers comfortably.

RESEMBLING a tear drop in its ultra-streamlined shape, a novel automobile has been developed by W. E. Miller, a Los Angeles, Calif., designer. The latest discoveries in streamlining and auto design have been incorporated in the construction of the car. The auto, used for advertising purposes, has seats for three persons. The body is mounted on a three-wheeled chassis.

Contractors Build Freak Test House

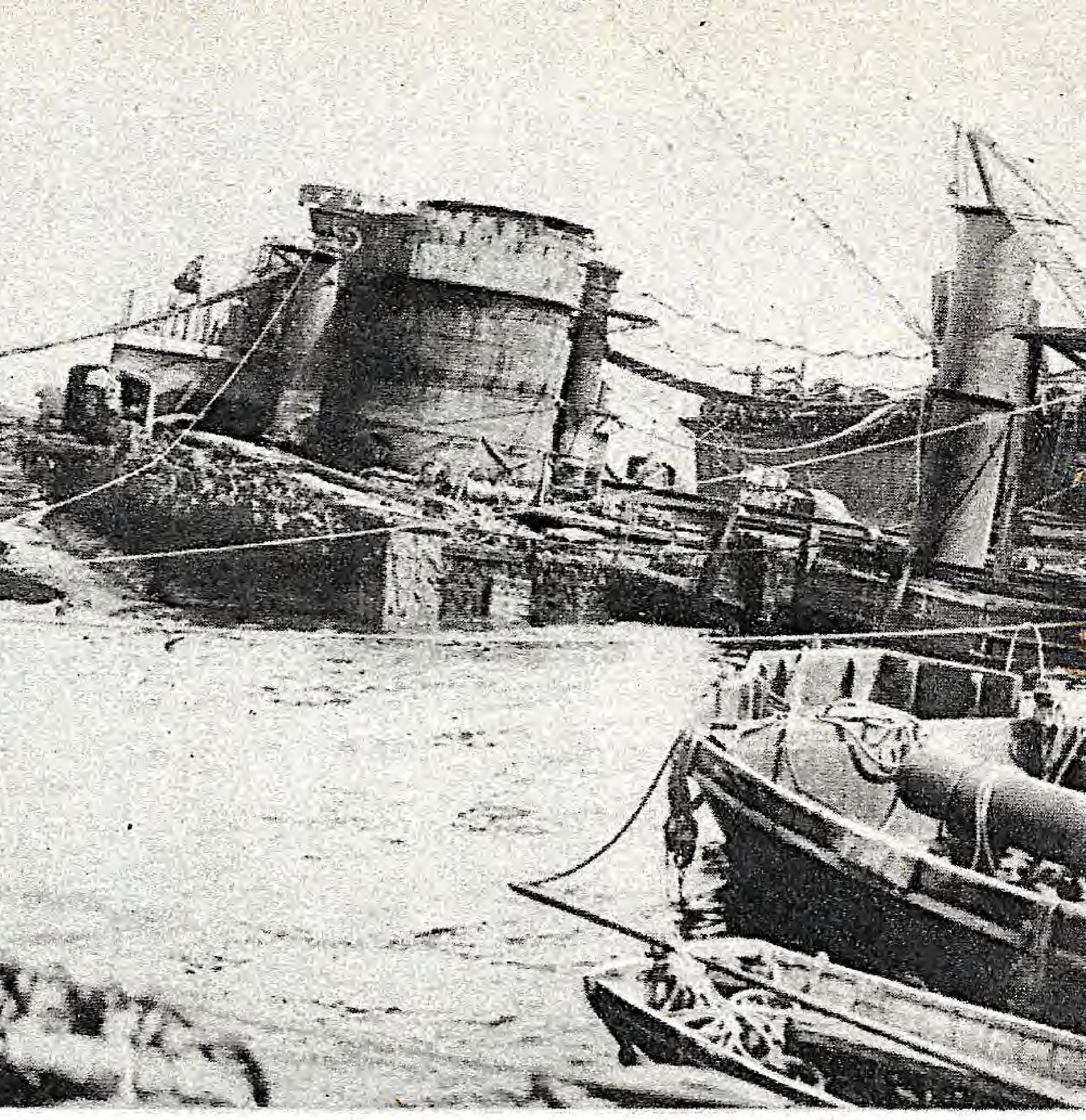
TO DETERMINE the feasibility and artistic effect of various materials for a group of new college buildings, a test building using many different materials was erected at Principia College, Elsah, Ill. From the results gleaned from the novel experiment, the combination and types of material to be used in the construction of the main buildings was determined.

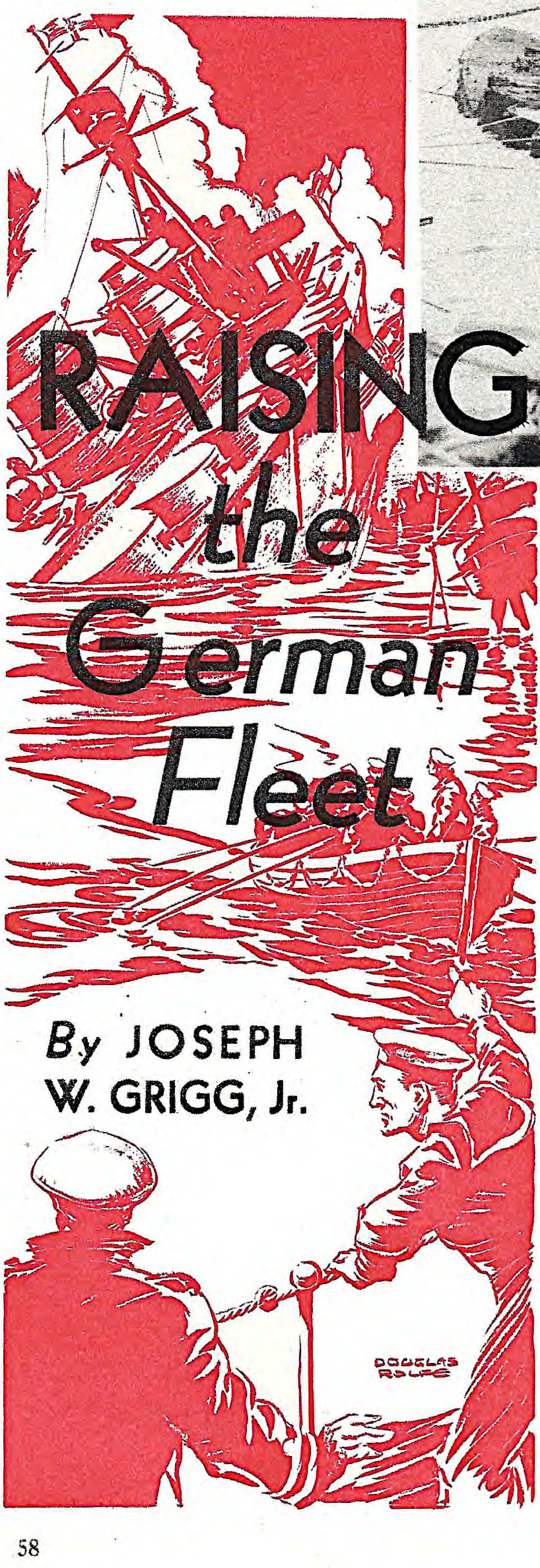
The small test building was constructed of stone, brick, cast concrete, and timber in brick and concrete. One side of the roof was made of concrete covered with slate, while the opposite side was plain concrete.



Contractors built this freak house to test combinations of materials to be used in constructing main college buildings at Elsah, Ill. It features many kinds of cement, brick, etc.

The crew of the *Kaiser Frederich der Grosse* leaped into small boats. The great German flagship heeled over and sank! Ship after ship followed her. Encased in seaweed and slime, the *Hindenburg* is pictured at the right as she was raised above the surface.





RAISING the German Fleet

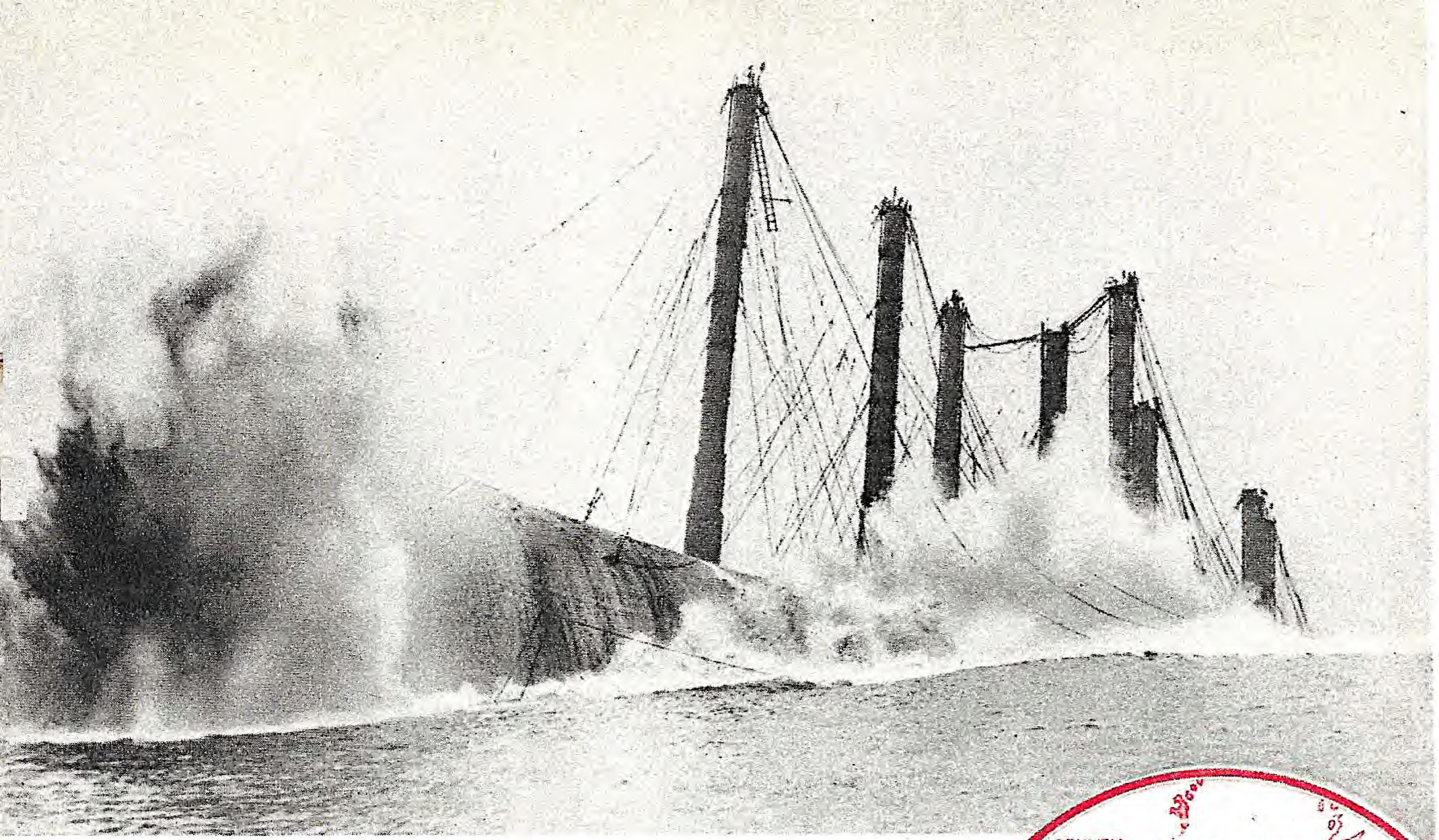
By JOSEPH W. GRIGG, Jr.

TOILING in the icy depths of Scapa Flow, the broad landlocked harbor in the Orkney Isles, north of Scotland, British engineers and divers today are enacting what probably will be hailed some day as the greatest salvaging epic in the history of the sea.

Though the world at large hears but little of their feats, they are dragging to the surface one by one of the giants of Germany's once proud High Seas Fleet, now battered rusted hulks, which have lain for 17 years fathoms-deep beneath the swirling waters of Scapa. The iron from some of those very ships is being used today by the modern Germany of Adolf Hitler in the great European armaments race.

To recall the first act of the drama of Scapa means going back to a sunny June morning in 1919 when line upon line of iron-gray German warships—some 74 all told—were swinging lazily at anchor in the harbor which had been Britain's chief naval base throughout the Great War. Kaiser Wilhelm's High Seas Fleet had been interned there since it was surrendered by Germany at the Armistice. Allied jealousy prevented the British receiving the ships and the German crews remained aboard.

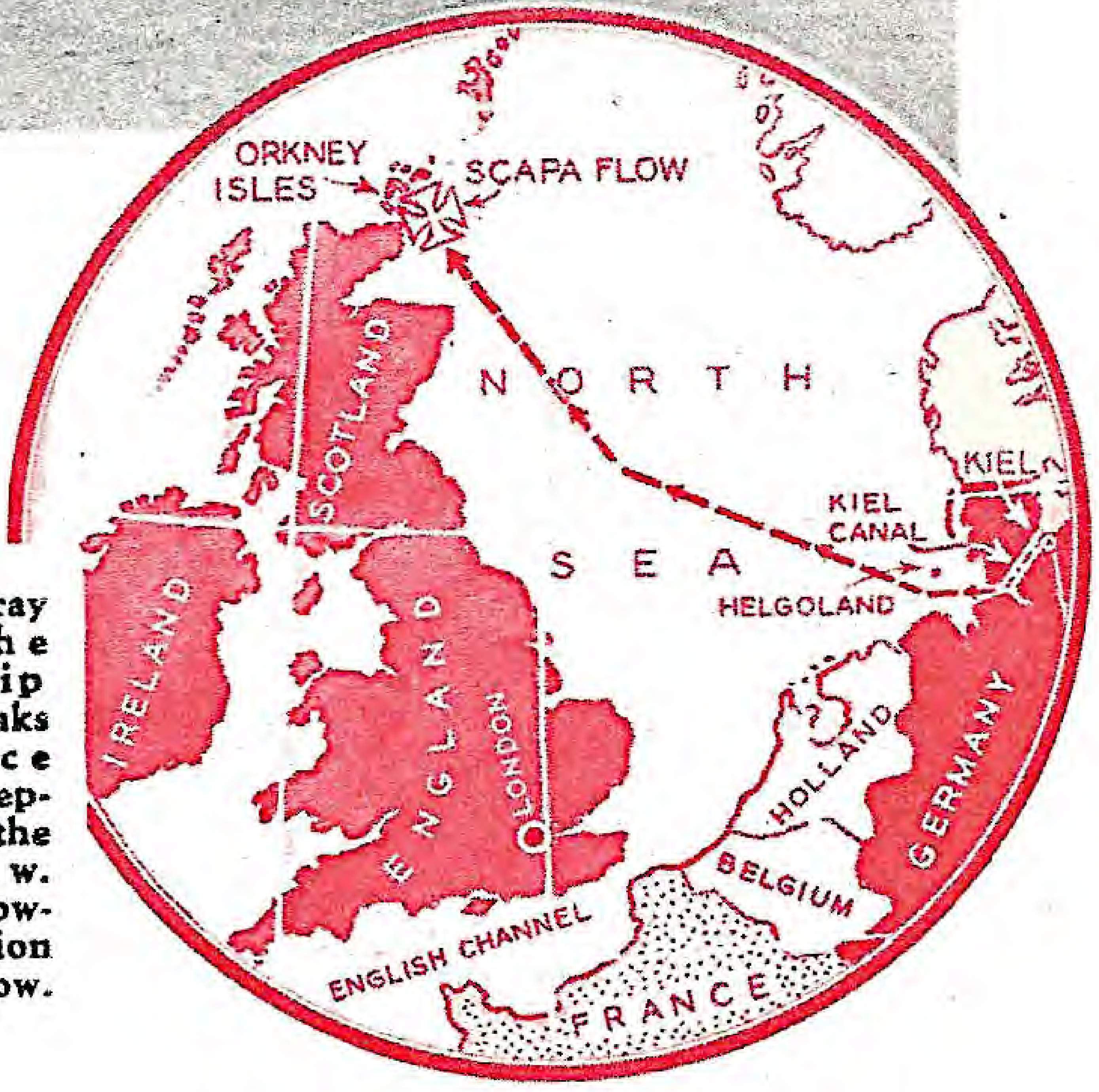
That morning of June 21, the bulk of the British fleet was out at torpedo practice in the North Sea. Only a few drifters steamed up and down the German lines. Suddenly the crew of the *Kaiser Friedrich der Grosse* were seen leaping into small boats. Then before the astonished eyes of the British sea-



men the great German flagship heeled over and sank. Ship after ship followed her. An urgent radio message brought the British fleet scurrying back two hours later. All the British could do, however, was to beach a few of the German destroyers. The Germans had opened the valves and scuttled their fleet.

Out of 74 ships the great majority sank to the bottom of Scapa Flow that day. For 12 years now salvagers have ventured their lives to float them again. As one corroded giant after another is laboriously pumped and hauled from the ocean-bed, its bulky carcase is towed 250 miles to the ship-breaking yards at Rosyth or Rothesay, both in Scotland, for breaking up and sales as scrap-iron. Hundreds of tons of that iron have been bought by Germany in the past two years, to be melted down and recast into big guns, shells, tanks and new battleships. Hundreds of tons more are going into armor-plating for British warships and into building Britain's merchant fleet. Some of the same salvaged iron is fulfilling the more prosaic role of girders in palatial new movie-houses, blocks of new apartment-houses and hotels in London.

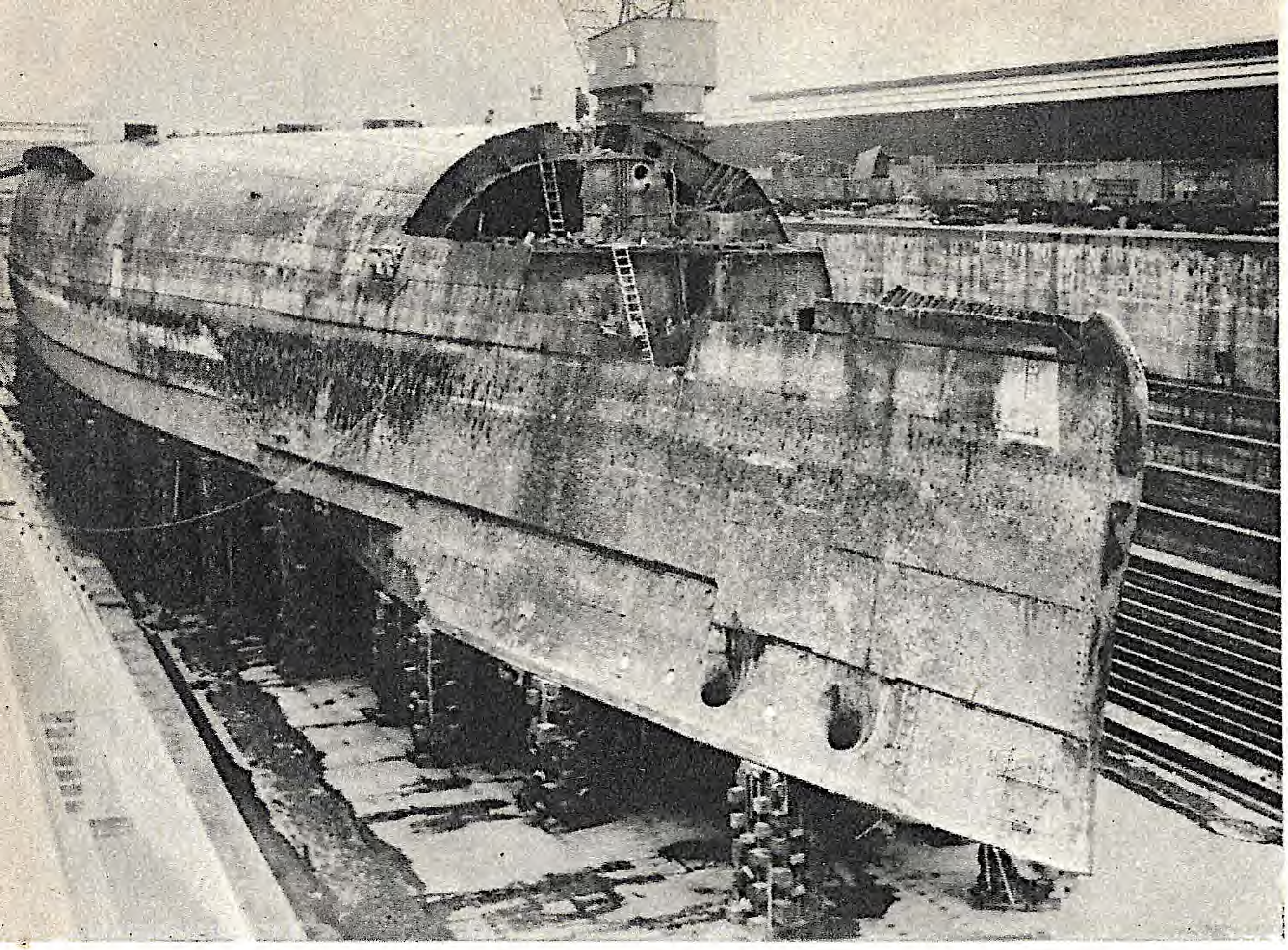
With ten of the largest ships still to be recovered the world's biggest salvaging job already has cost more than $3,000,000. The value of the ships so ruthlessly scuttled is estimated at close on a hundred times that figure. Yet the salvagers have barely, if at all, recouped themselves for the expenditure involved.



Sending spray skyward, the Battleship *Kaiserin* breaks the surface after long preparation by the salvage crew. A map showing the location of Scapa Flow.

For more than five years the German High Seas Fleet lay rusting at the bottom of Scapa Flow. None even of the recognized salvaging experts was willing to risk the cost of trying to bring the warships to the surface again. Then one day early in 1924 a virtually unknown Londoner named E. F. Cox took a trip up to Scapa. At that time he was in his late thirties and managing director of the iron and steel merchanting firm of "Cox and Danks," of London. He had had no previous salvaging experience, but a friend had suggested to him that there was a mine of scrap iron rusting away beneath the waters of Scapa Flow, waiting for whoever was prepared to bring it up. Cox's imagination was fired and he spent several days surveying the wreckage. A few weeks later he had an Admiralty contract in his pocket for salvaging 25 German destroyers.

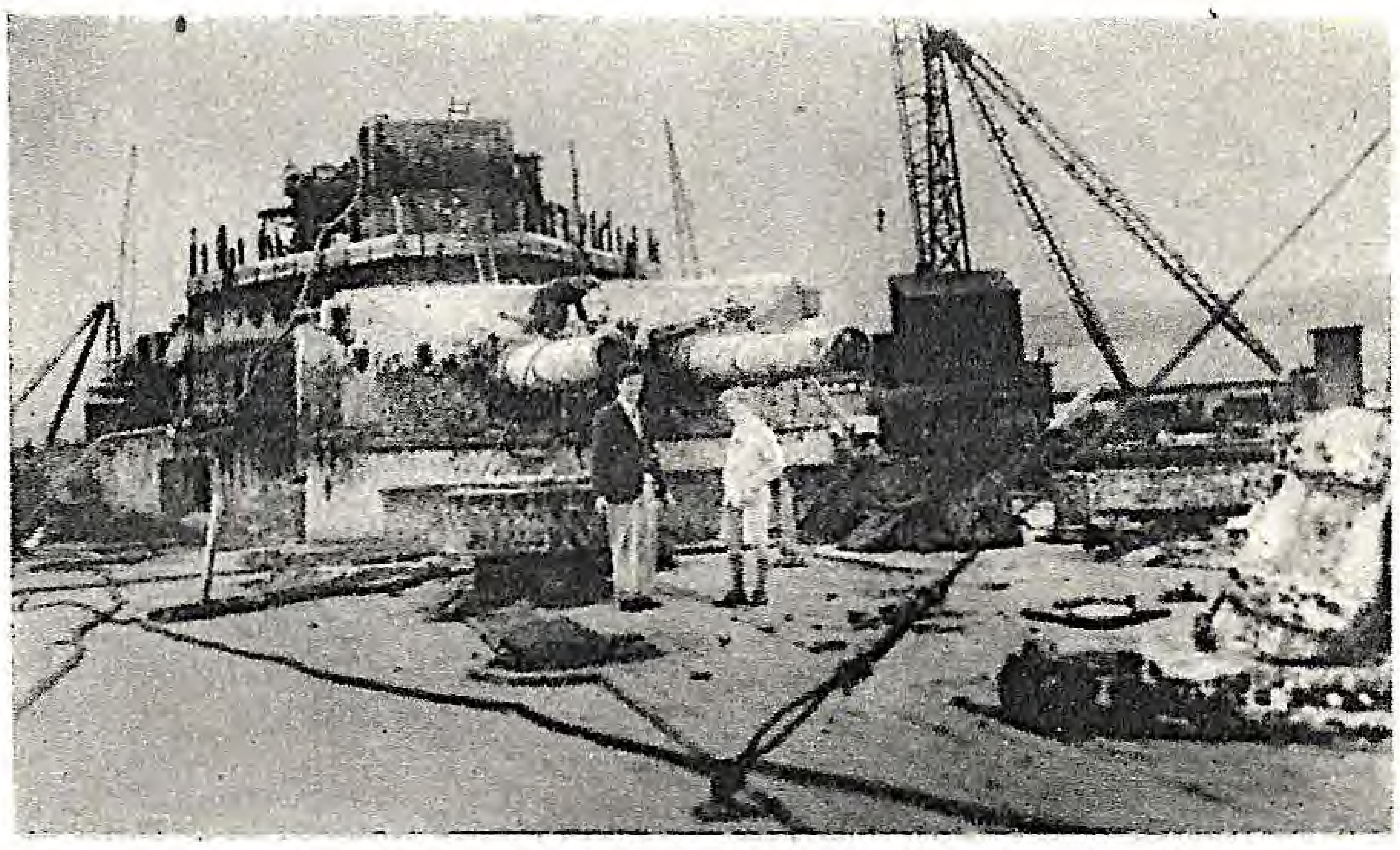
Cox immediately got together the best



Workmen cut up the once proud *Koenig Albert,* now only an inverted hulk in a dry dock after being raised from the depths of Scapa Flow last April. The metal has many uses.

●

Hard luck marked the raising of the 28,000-ton *Hindenburg* pictured below. The great ship, largest boat salvaged, twice slipped back into the depths. Workers made 800 patches on the hull.



engineers and divers in Britain. His equipment alone including sections of a German floating dock cost him a round $200,000 at the outset. In April, 1924, the greatest salvaging job ever undertaken was begun. On August 1 Cox watched triumphantly as the first destroyer, caked in muck and green sea slime, was hauled to the surface. By April 30, 1926, all 25 destroyers had been raised, several of them in less than a fortnight.

The salvaged destroyers ranged between 750 and 1,300 tons each. In one case three were located in a heap with two lying crosswise over the third. Most, however, were lying alone. The technique employed by the salvagers was to sink sections of the floating dock and place them along each side of the wreck in a kind of hamsandwich fashion. Wire hawsers were secured under the keels of the ships which were then hauled up gradually to the surface. In some instances they were actually dragged up by sheer manual labor with winches and tackle.

As a rule, however, the rise of the tide was put to work to supply the requisite lifting power. At low water the tough wire hawsers would be hove taut under the vessels and the rise of the tide was sufficient to lift them off the bottom. Gradually they were dragged towards the shore, with each rising tide lifting them a little further from the ocean bed, until they were beached and patched up for refloating. Each hulk was then put to sea again and towed something like 250 miles for breaking up.

With 25 of the destroyers salvaged, Cox set himself the tremendous task of stealing from the ocean's clutches the giant battleships and battlecruisers, once the pride of Germany's navy. Some of these weighed nearly 30,000 tons and lay mostly bottom-upwards or on their sides in 15 to 18 fathoms of water. No one had ever attempted to raise ships of this size before. Daring freebooters of the Orkneys already had stripped the partly visible *Seydlitz* of all valuable metal above the water line and had even fished brass fittings from underwater.

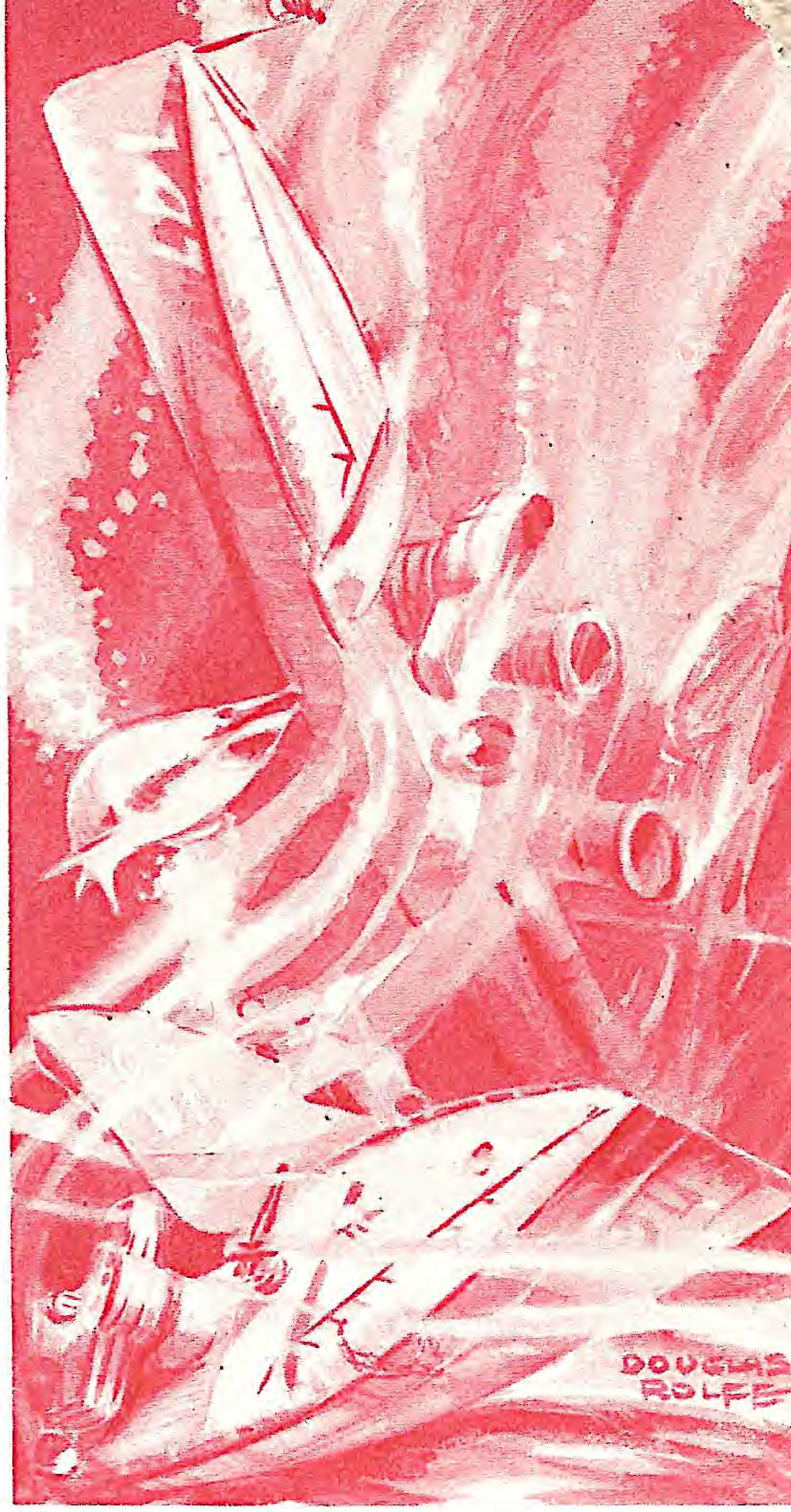
Attention had been attracted to the possibilities of compressed air shortly before by Major Gianelli's raising of the overturned Italian battleship, *Leonardo da Vinci.* The

Italian expert paid a visit to Scapa Flow, presented Cox with a volume describing the raising of the Italian ship and urged him to attempt the technique with the ponderous German wrecks. After spending $165,000 in a futile effort to float the big *Hindenburg* by old methods, Cox turned with the new to the smaller ships.

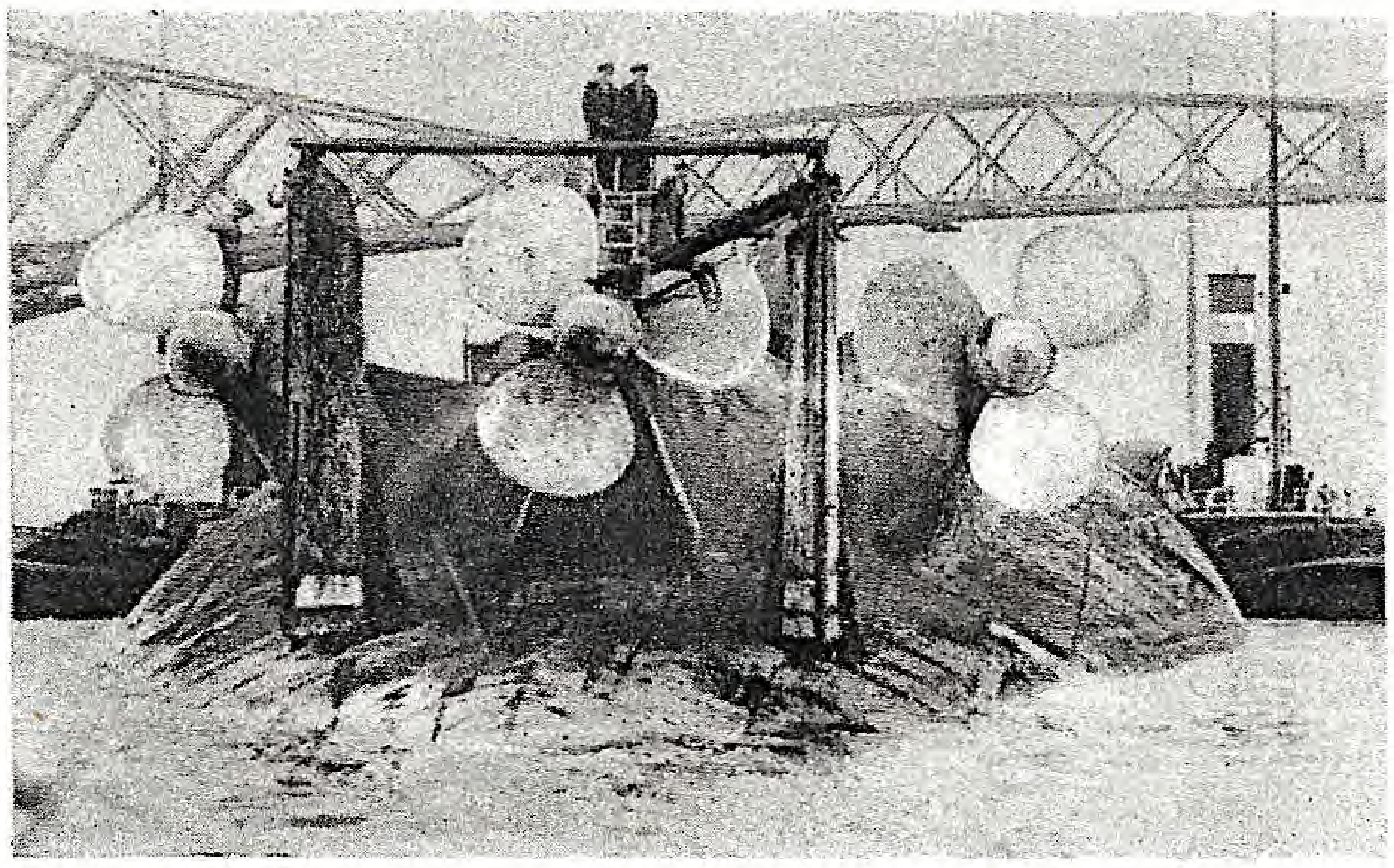
The salvagers began with the 23,500-ton battle cruiser *Moltke* which lay on the ocean floor with a list of 16½ degrees. As a preliminary operation, tall cylindrical airlocks had to be bolted to the sunken hulls. Men worked inside these under air pressure which kept the water from rising to more than a certain level through the various holes in the decks below. For months they toiled with oxy-acetylene apparatus fathoms below the surface of Scapa in a foetid, stinking atmosphere, dripping with slime. All the time they risked explosions from the foul air. Explosions did occur, although fortunately only one man lost his life.

Gradually the Scapa salvagers worked their way through each gigantic hulk, cutting away pipes and ventilating shafts that passed through the bulkheads. As they did so they patched up the holes left and made each compartment watertight. Then, when every hole had been sealed, came the critical moment for attempting to raise the vessel. This was done by pumping air into the interior

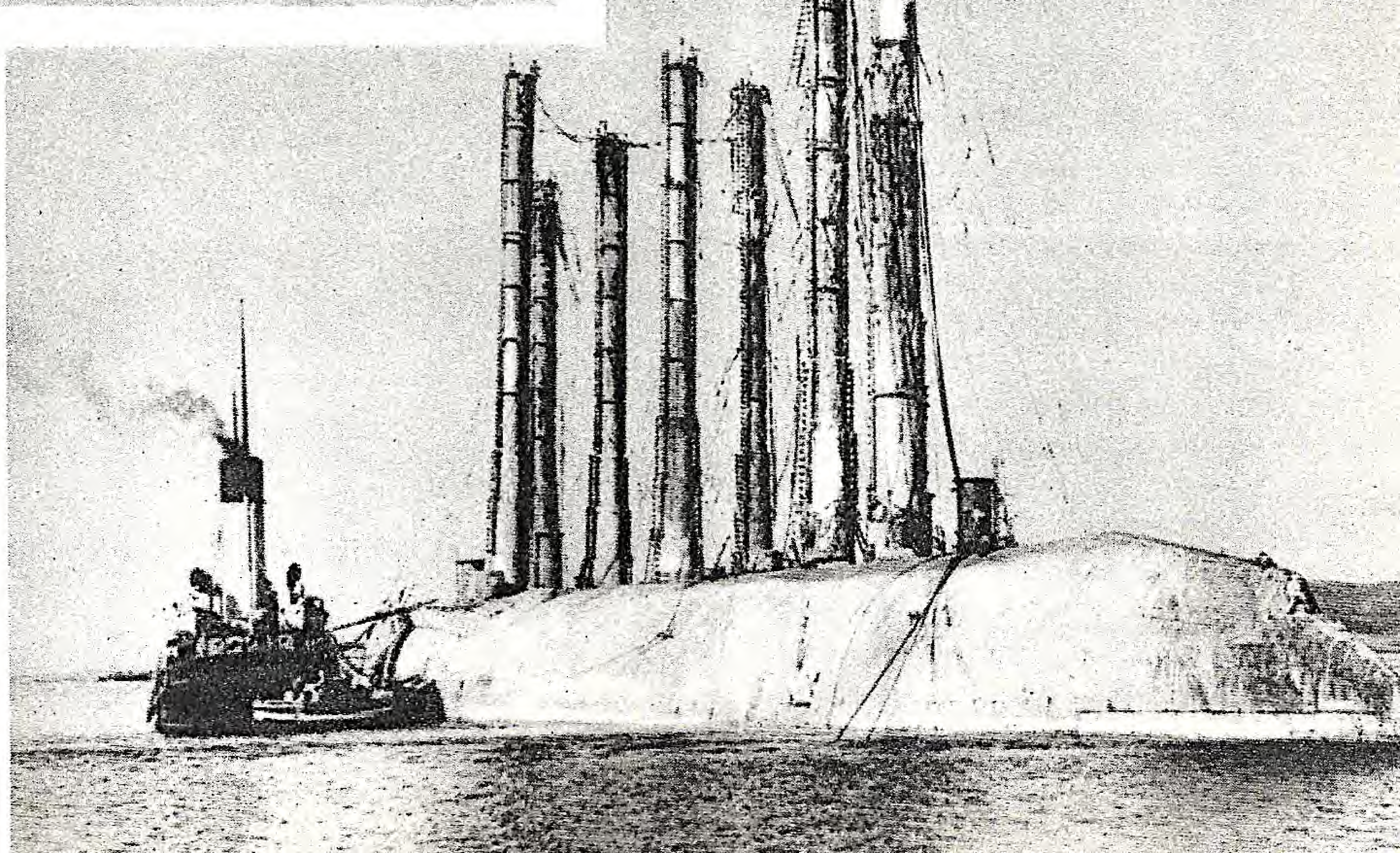
[*Continued on page* 155]



The salvaged destroyers ranged between 750 and 1,300 tons. In one case three were located in a heap with two lying crosswise over a third ship

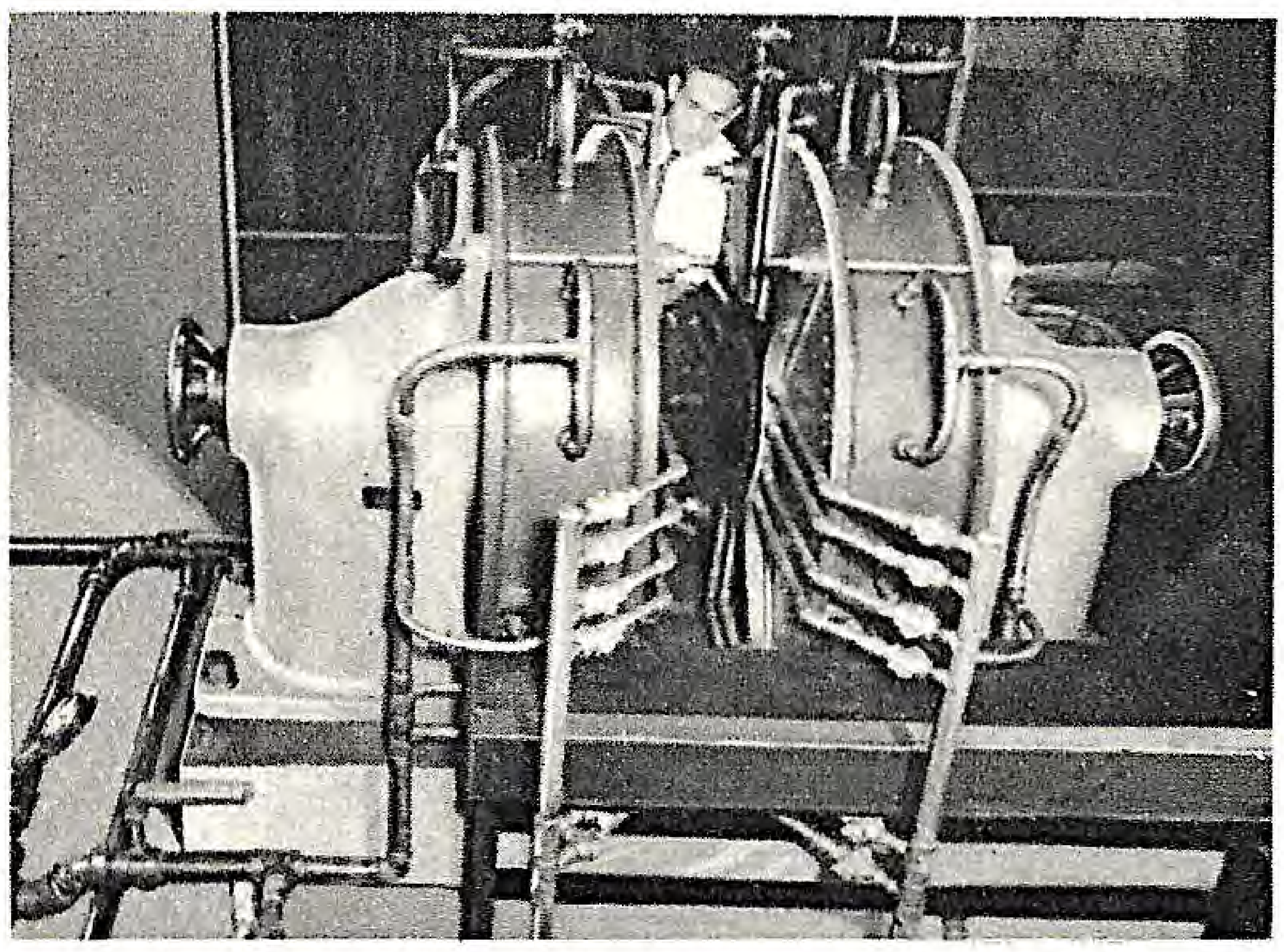


The three big propellers of the 25,000-ton *Kaiserin* are shown above as she was towed away from Scapa Flow.



Resembling a whale with great harpoons in her back, the Battleship *Konigsberg* being towed to dry dock to be scrapped for metal.

Scientists Design 12-Ton Magnet To Catch Cosmic Rays



Designed by Prof. Arthur H. Compton, Nobel Prize scientist, this 12-ton magnet will launch new cosmic ray studies at the University of Chicago. It is hoped that cosmic rays with energies as high as 40 billion volts can now be studied.

A GIANT 12-ton magnet generating a magnetic field equal to 40,000 times that exerted by the earth is the heart of a new cosmic ray machine installed at the University of Chicago. The powerful magnet was designed by Prof. Arthur H. Compton, Nobel Prize scientist, and his research assistant, Haydon Jones.

The magnet will be part of a Wilson cloud chamber equipment that will enable photographic determination of cosmic ray impacts to be taken. As cosmic rays pass through the moist air of the cloud chamber, they will leave a fog trail that can be photographed. The magnet will curve the paths of the rays of high energy to a less extent than those of low energy, enabling Professor Compton to determine from the photos whether the ray particles are positive or negative in character.

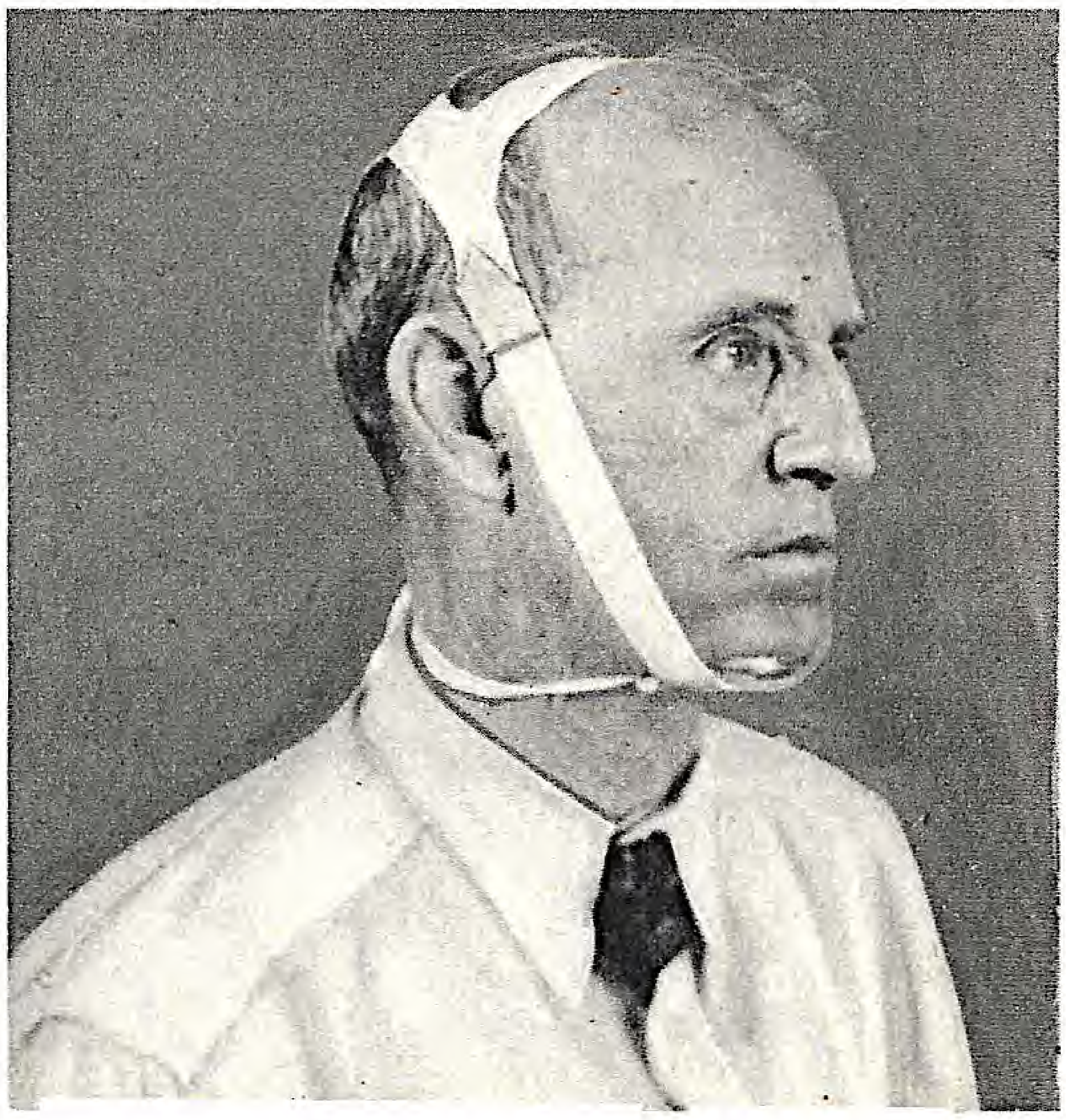
Hospital Devises Infant Burn Room

SWIFTER and easier emergency treatment in the crucial initial stages of burns incurred by children is the result of the opening of a new burn-treatment room at the General Hospital in Cincinnati, Ohio. Colored tubs for bathing the children in soothing liquids are features of the new room.

To keep the juvenile mind occupied during treatments, a huge kaleidoscope flashes hundreds of colored comic designs on the walls. Dr. H. Jerry Lavender of the hospital staff designed the room. The children react well to the new room, laughing and temporarily forgetting their painful burns and scalds while they observe the antics of Mickey Mouse and other juvenile favorites.

Infants are bathed in soothing liquids in a special burn-treatment room at the General Hospital, Cincinnati, Ohio. Colored designs flashed on walls help infants to forget pain.

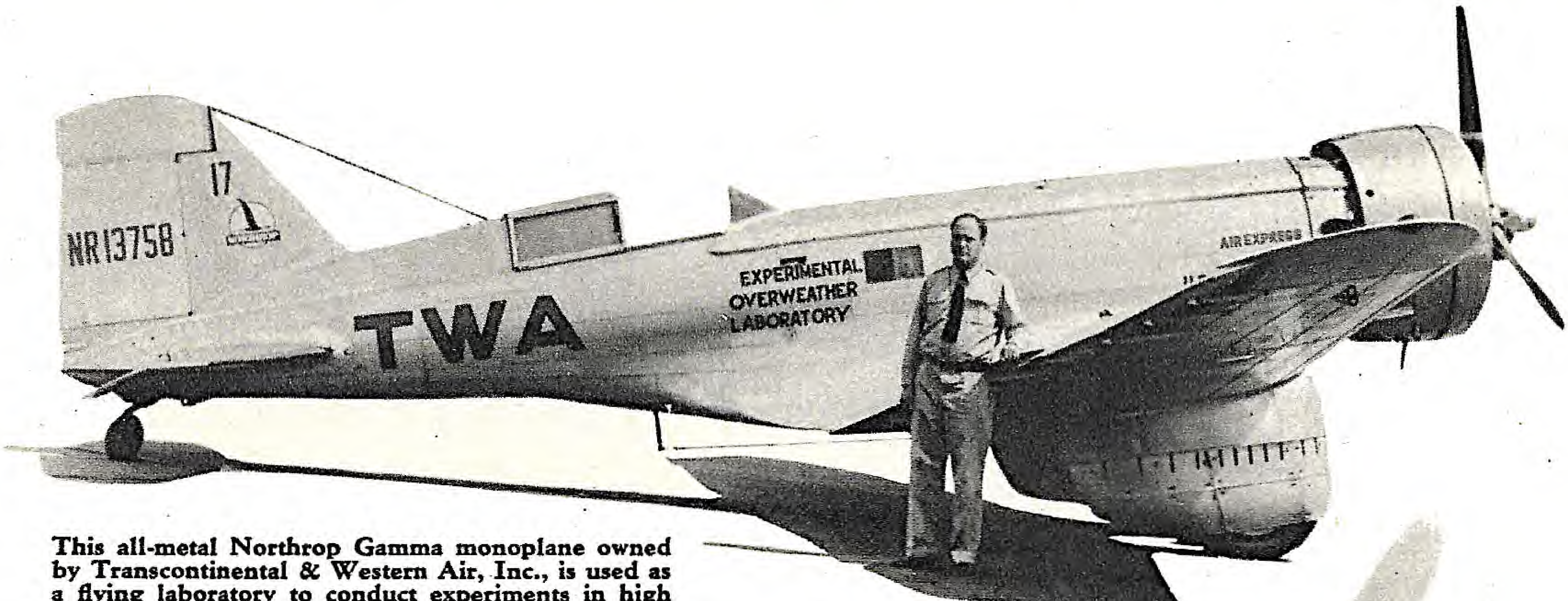
Chin Plate Stops Mouth Breathing



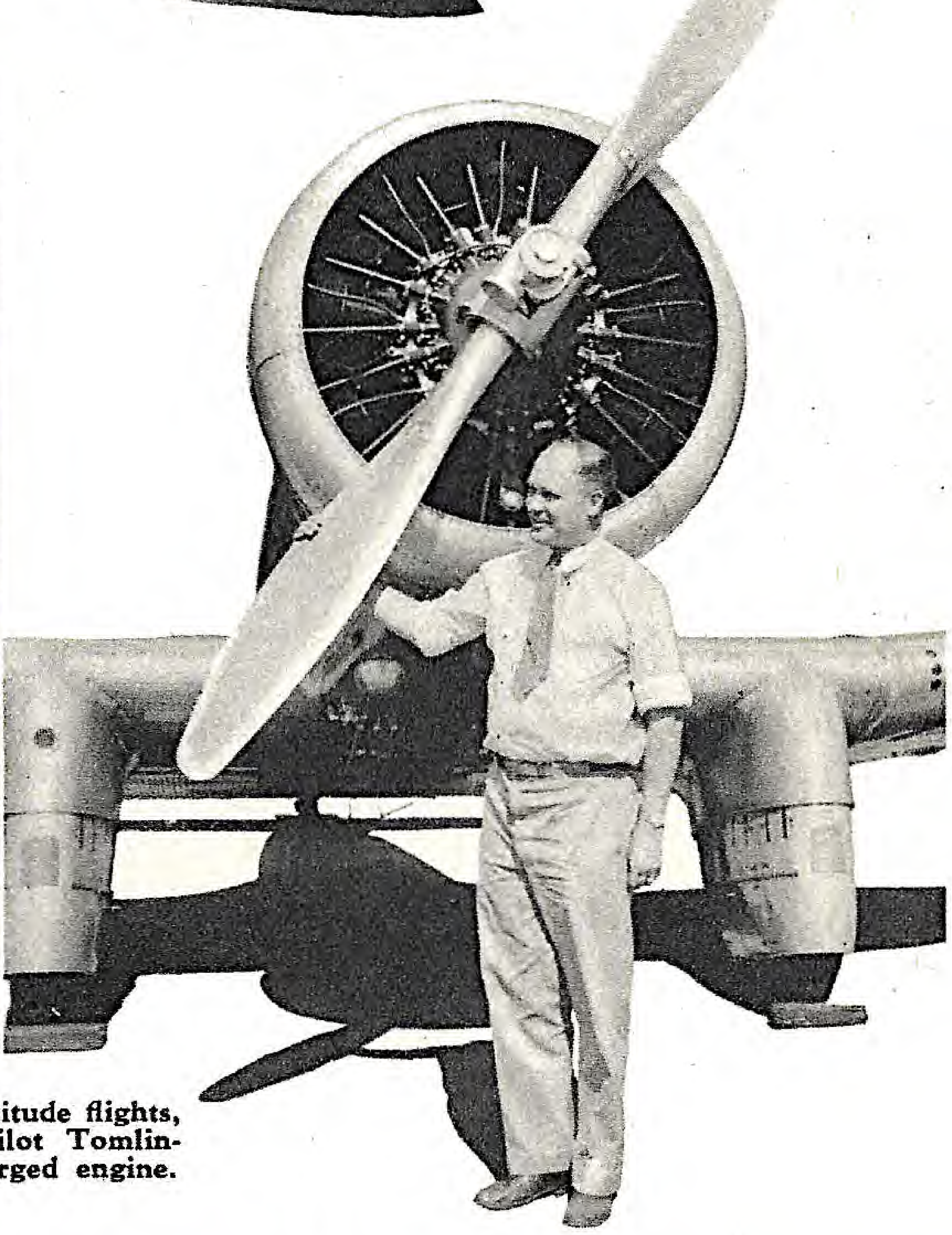
Designed to eliminate mouth breathing while sleeping, this adjustable chin plate builds up the habit of nose breathing to such an extent that its use is soon proved unnecessary.

AN ADJUSTABLE chin plate has been developed by Oliver Lowry, Meridian, Miss., which, if worn at night while sleeping, eliminates mouth breathing, the principal cause of "whistling" and snoring. The device consists of a padded metal plate that fits the contour of the lower jaw. Adjustable elastic bands insure a satisfactory fit. Two small ribbons that run around the neck are needed when the device is worn by persons having short, stubby chins.

Plane Makes Overweather Tests



This all-metal Northrop Gamma monoplane owned by Transcontinental & Western Air, Inc., is used as a flying laboratory to conduct experiments in high altitude flying. Lieut. Comdr. D. W. Tomlinson, former Navy ace, pilots the plane for TWA.



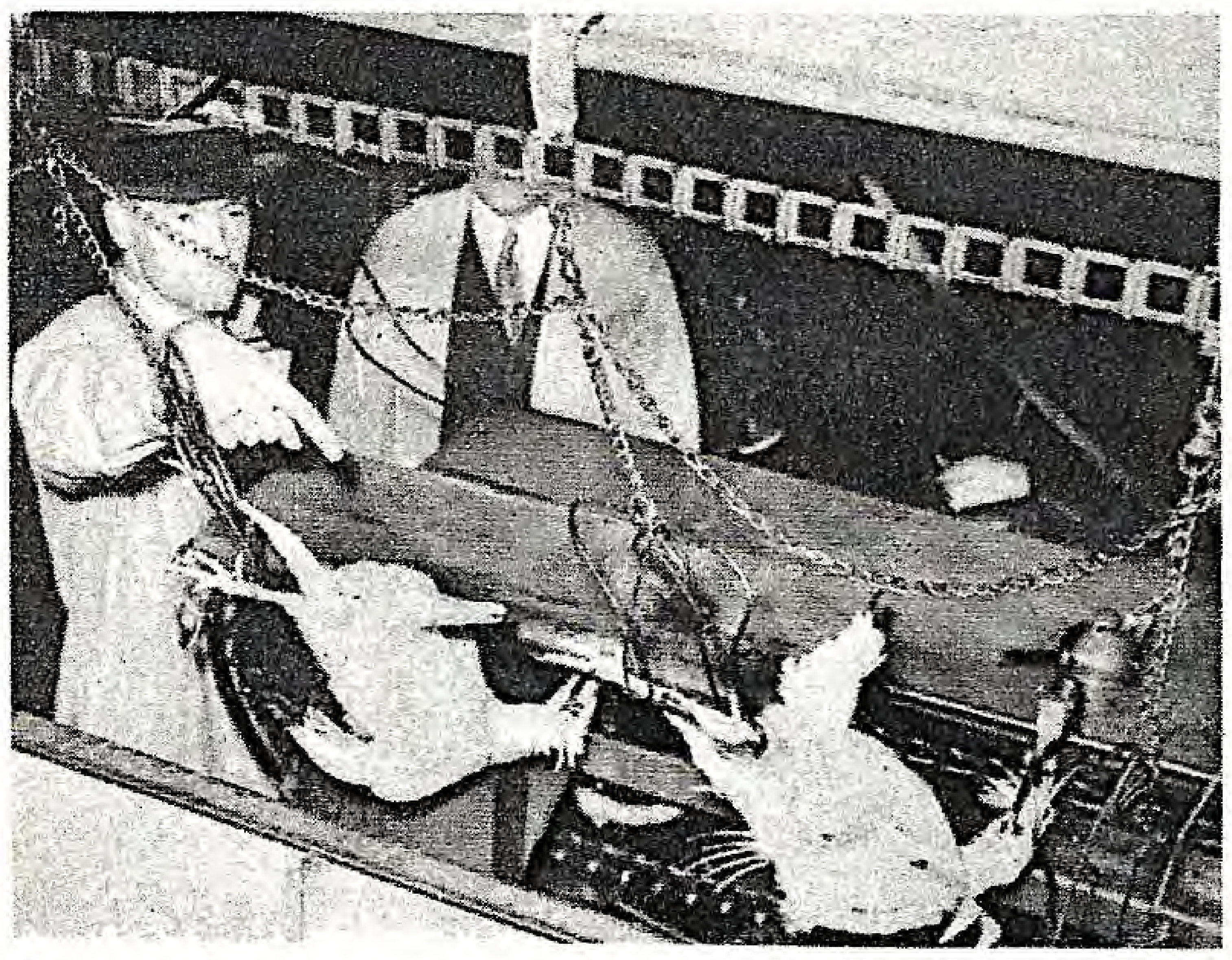
James Heistand, TWA engineer and observer on the altitude flights, checks his oxygen tube and instruments. Right—Pilot Tomlinson at the propeller of the plane's 715 H.P. supercharged engine.

ATTAINING altitude of 35,000 feet, a TWA supercharged "overweather" plane is being used as a flying laboratory to determine the feasibility of transport aircraft operation at high altitudes. At such heights, airplanes are above the reach of storms.

The test flights are being made by D. W. Tomlinson, former Navy ace, and James Heistand, TWA engineer. In order that instrument readings may be recorded permanently, photographs of the entire instrument panel are made at each thousand foot level.

Through the use of a special frame, Comdr. Tomlinson can converse with the ground and breathe oxygen without using his hands. He wears a helmet made from a handkerchief.

New Electrical Apparatus Will Kill Poultry Humanely



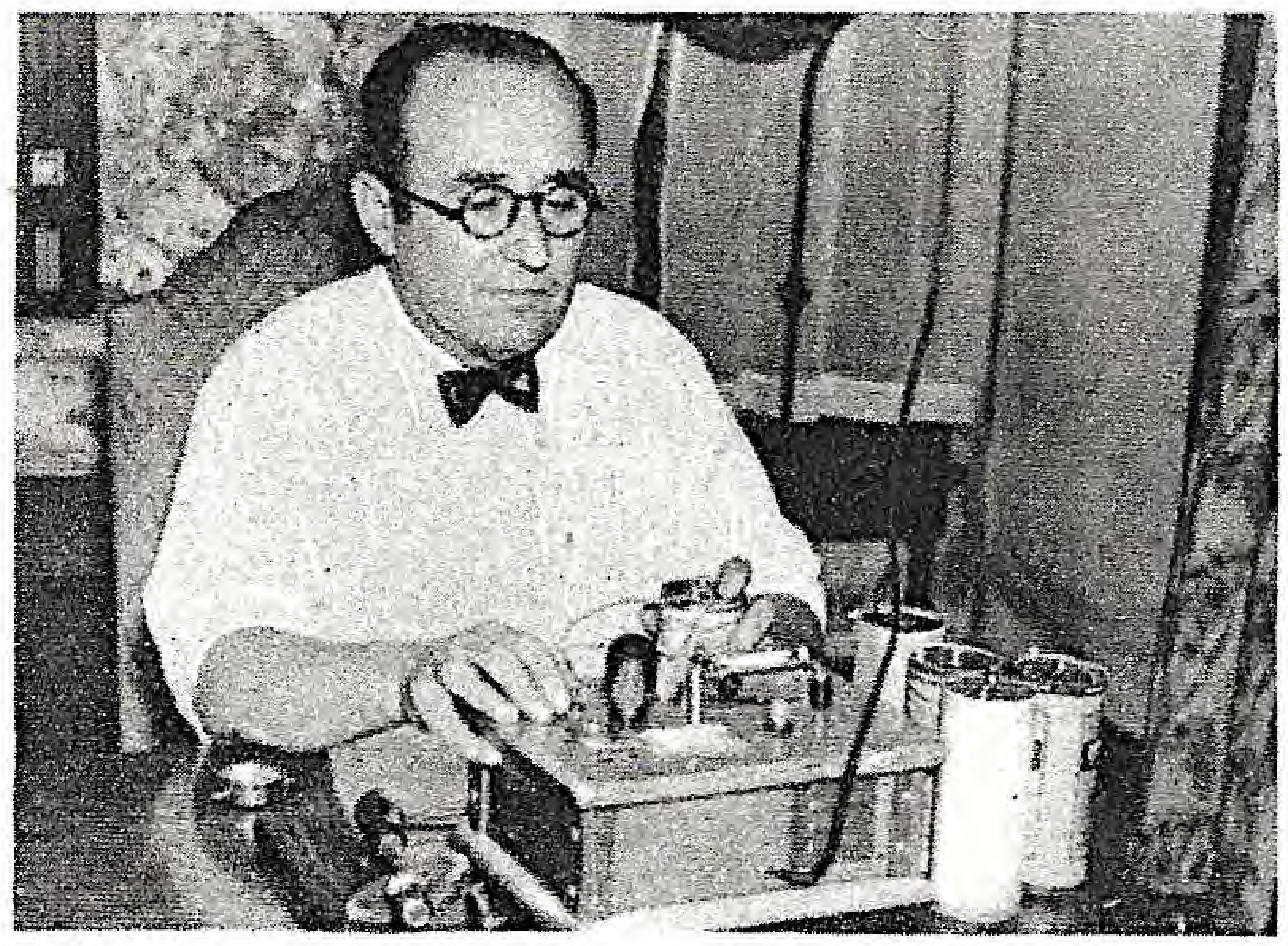
Operated by step-up transformers working off 110 volt power line this device electrocutes fowl for mass distribution. It is the invention of Paul Onorato and Emile Weinaug, of Calif.

ALTHOUGH the first electrical apparatus for electrocuting fowl was invented more than 188 years ago by Benjamin Franklin it was not until recently that such a device was conceived for present day requirements. Assisted by Emile Weinaug, a German machinist, Paul Onorato, of San Francisco, produced a belt conveyor apparatus for humanely putting fowl to death by sending a 1,500-volt charge through them. The device works on ordinary house current, stepped up by transformers with a variable output. The legs of the birds are fastened to an overhead clip while their heads contact metal electrodes as they pass by on the conveyor belt.

A. C. Rectifier Recharges Dry Cells

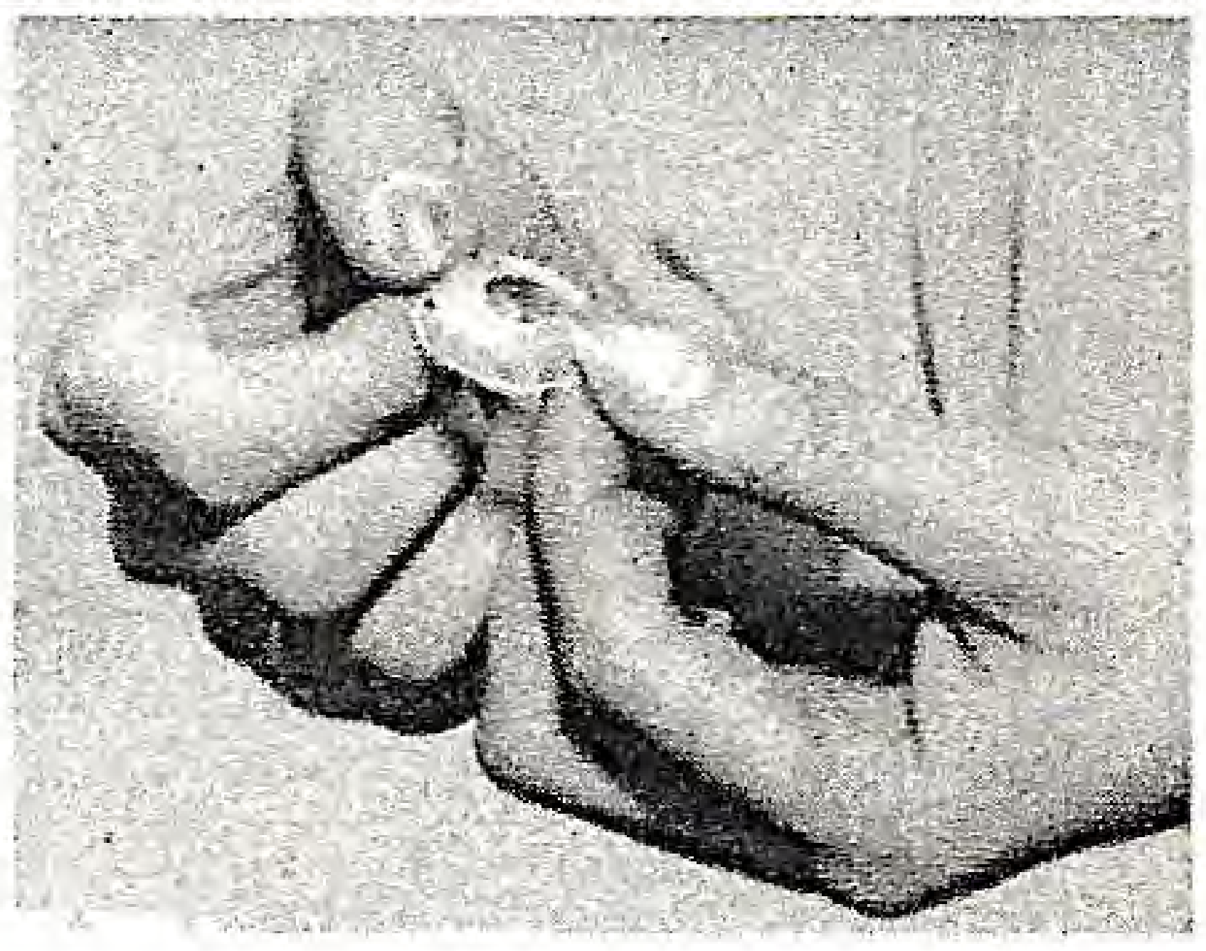
DRY cells no longer have to be thrown away after their charge has been consumed according to William F. Skinner, Miami, Florida, inventor. A special rectifier device operating from any convenient light socket recharges the familiar flashlight cell in a few minutes. The larger sizes of dry cells can also be recharged in the same manner. The rectifier unit is of the copper oxide type and changes the pulsating alternating current into pure direct current having a voltage of about 1.25. A transformer installed ahead of the rectifier reduces the 110 volts to the low voltage required.

In experiments with various sizes and types of dry cells it was found that they could be recharged fourteen times before it was necessary to discard them.



Dry cells no longer need to be thrown away after their current supply has been consumed. W. F. Skinner of Miami, Florida, demonstrates a house current recharging device for dry cells.

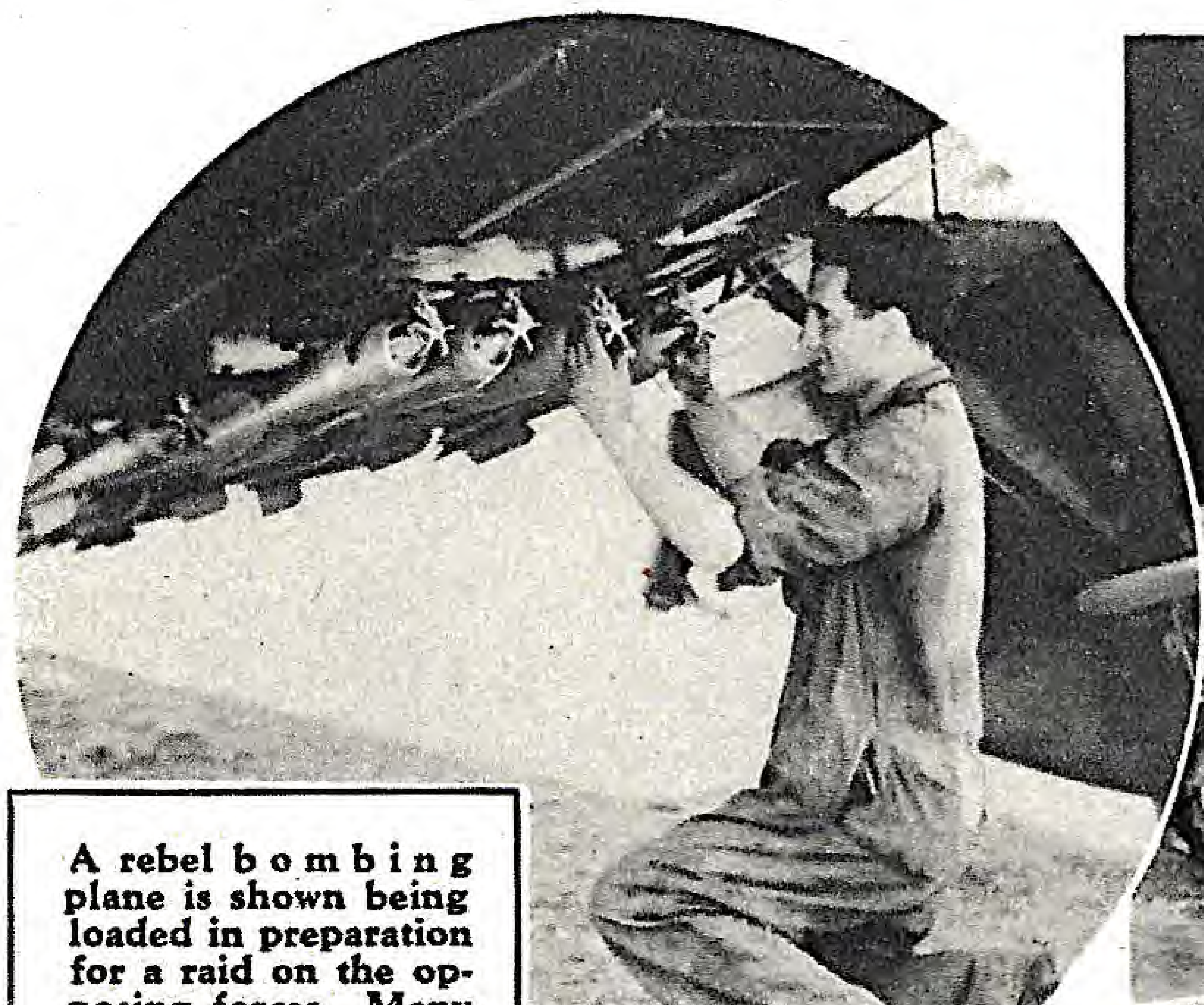
Invisible Lens Worn Under Eyelids



Worn under the eyelids these new spectacles are practically invisible. They are the invention of Dr. William Feinbloom, of New York. The glasses are cast to fit the patient's eyeball.

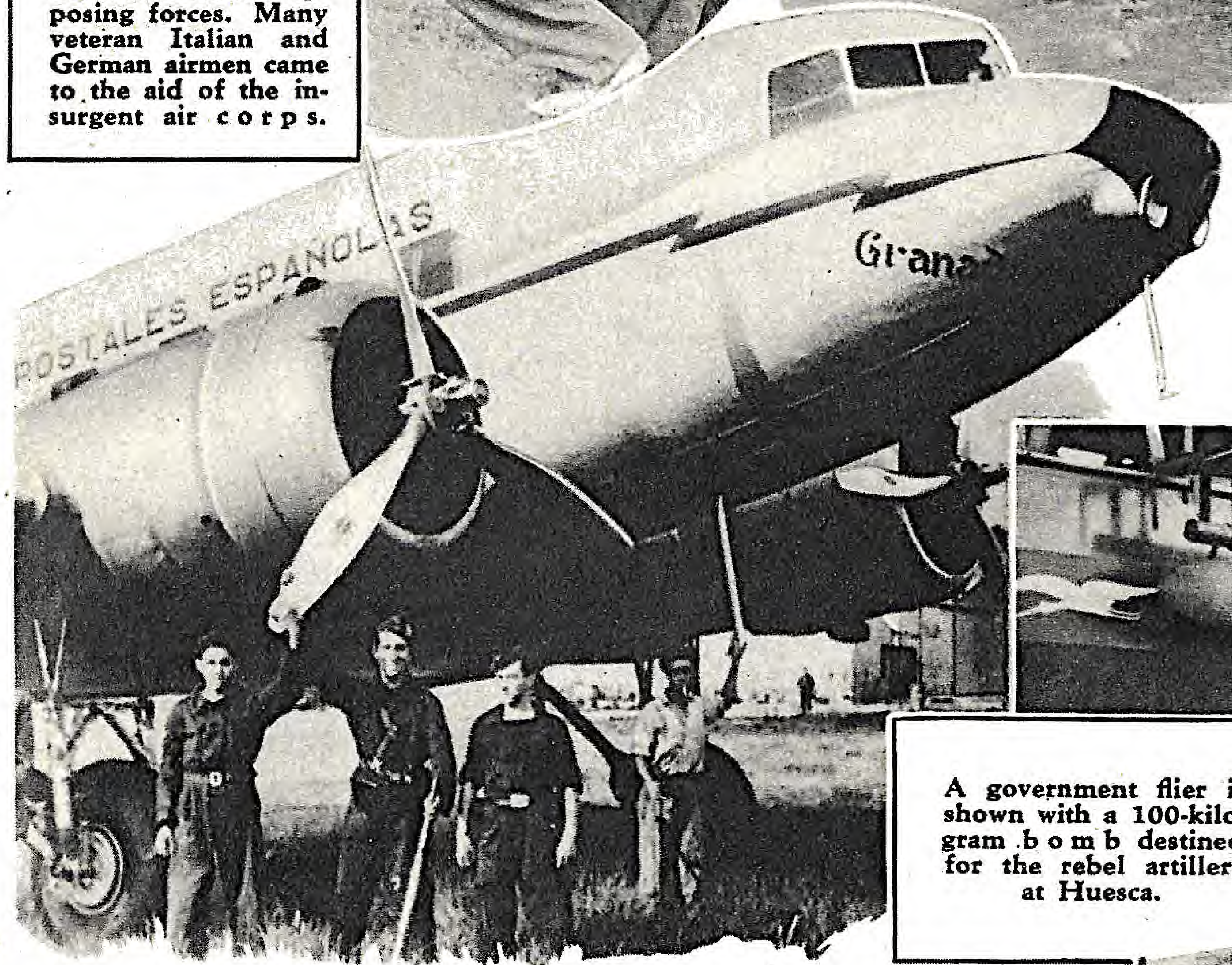
IN a demonstration before the American Academy of Optometry in Chicago, Dr. William Feinbloom, a New York optometrist, demonstrated a perfected type of invisible eyeglass to be worn under the eyelids. Unlike European spectacles of a similar nature the new glasses eliminate misfits since each lens is made over with a wax cast of patient's eye.

Spanish Battle With Improvised Arms

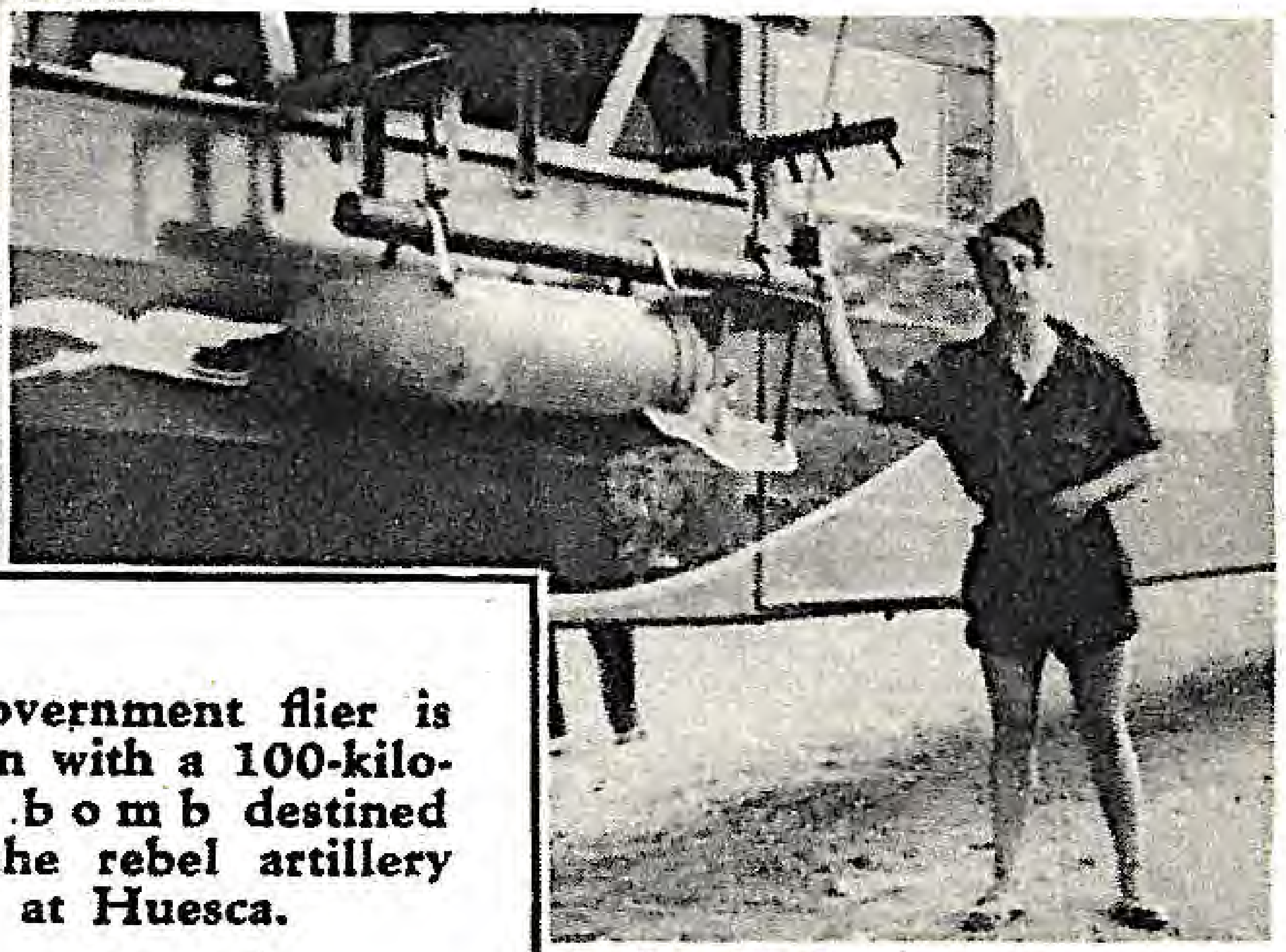


A rebel bombing plane is shown being loaded in preparation for a raid on the opposing forces. Many veteran Italian and German airmen came to the aid of the insurgent air corps.

Loyalists converted this truck into an improvised tank but the steel plate did not prevent its capture by rebels at Oyarzun. They put it into use transporting troops.



This giant mail plane was seized by the leftist government at the Barcelona airport and used to drop bombs on the Fascist rebels in the early days of the fighting.

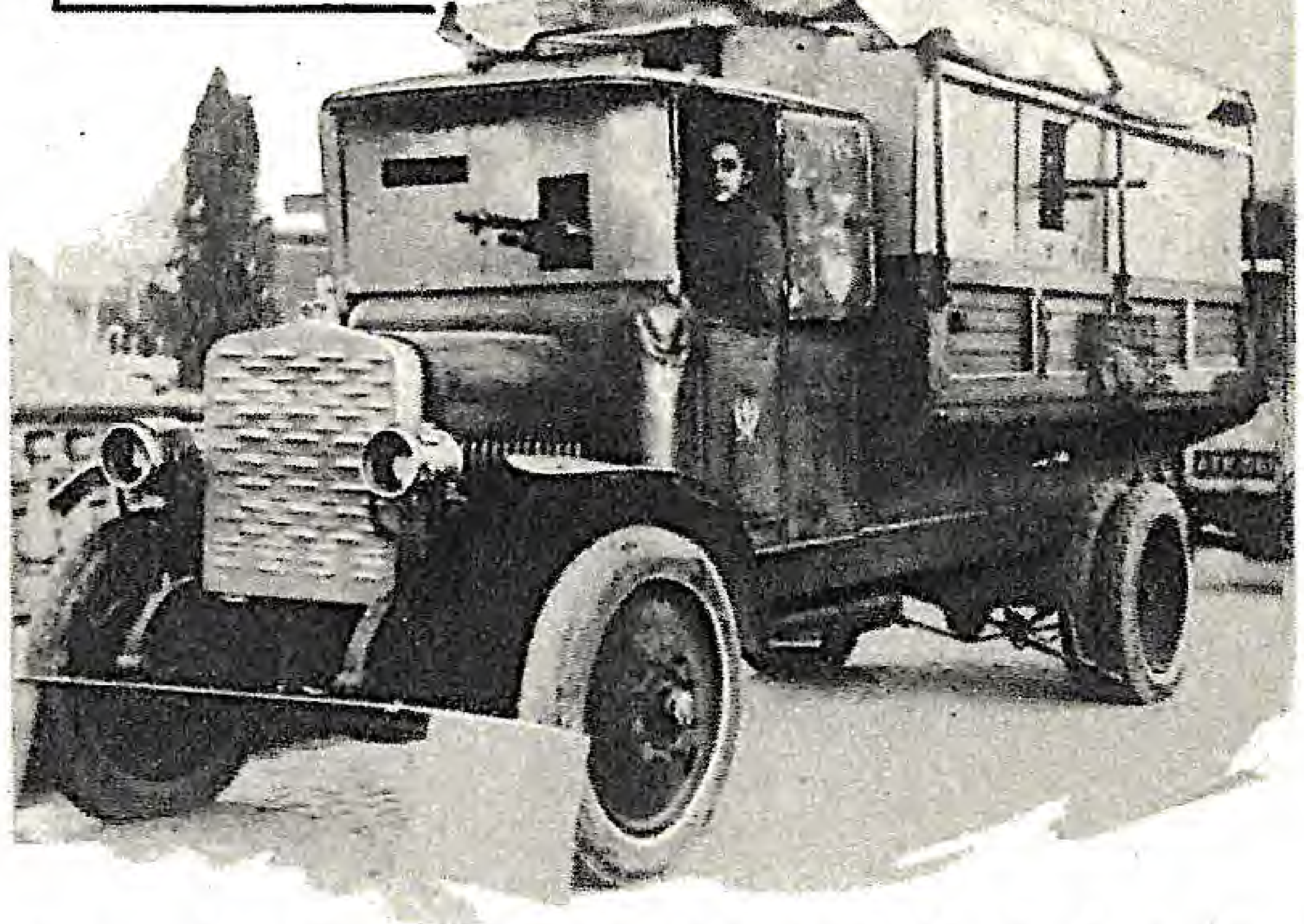


A government flier is shown with a 100-kilogram bomb destined for the rebel artillery at Huesca.

DESPERATE Spanish factions have displayed great ingenuity improvising the weapons which most governments refused to permit them to buy for their bloody civil strife.

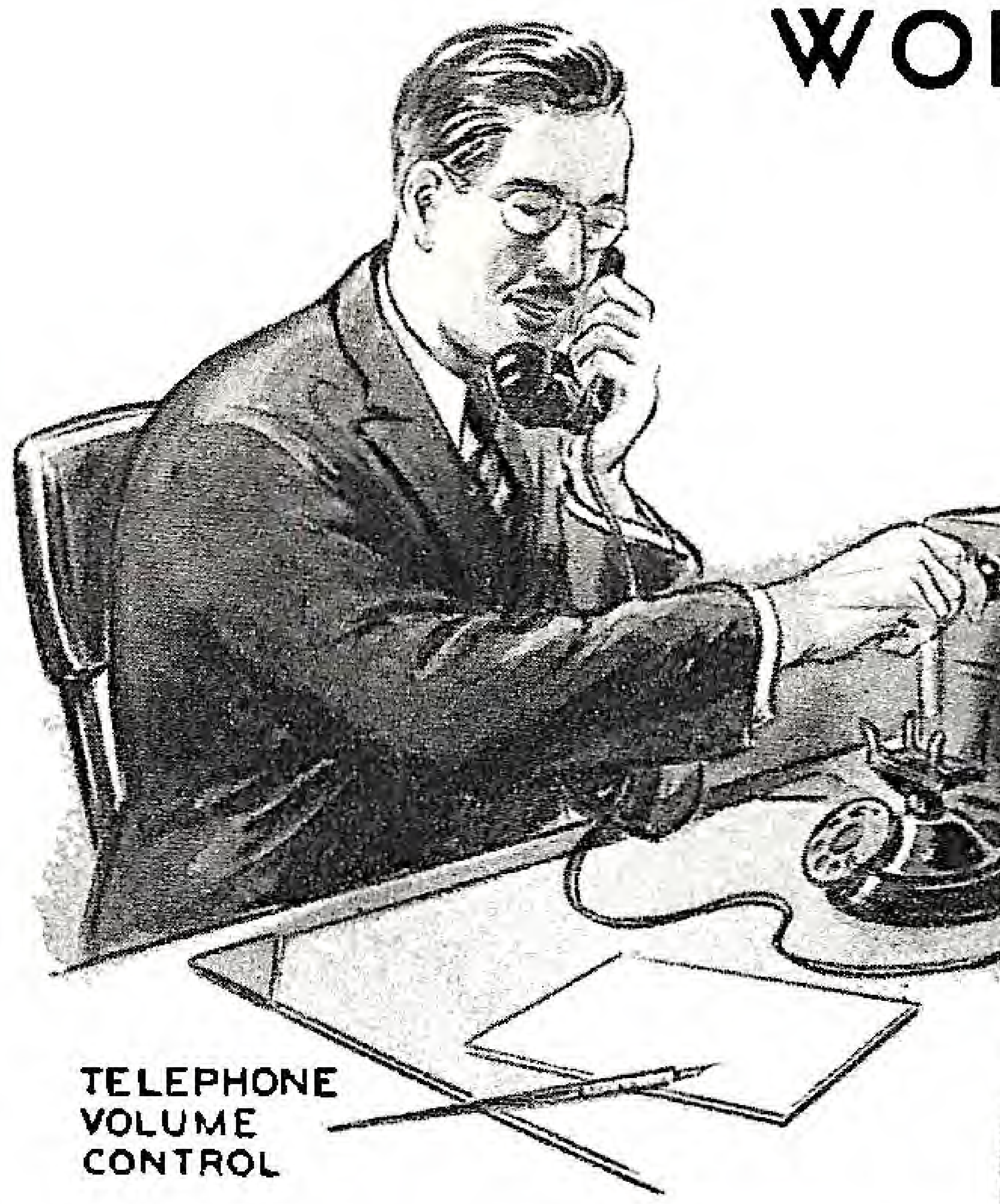
Bells of churches and convents in Madrid were melted down to make armored plate for automobiles of the Loyalist militia. Hand grenades were made by sawing water pipes into short lengths and filling them with explosives.

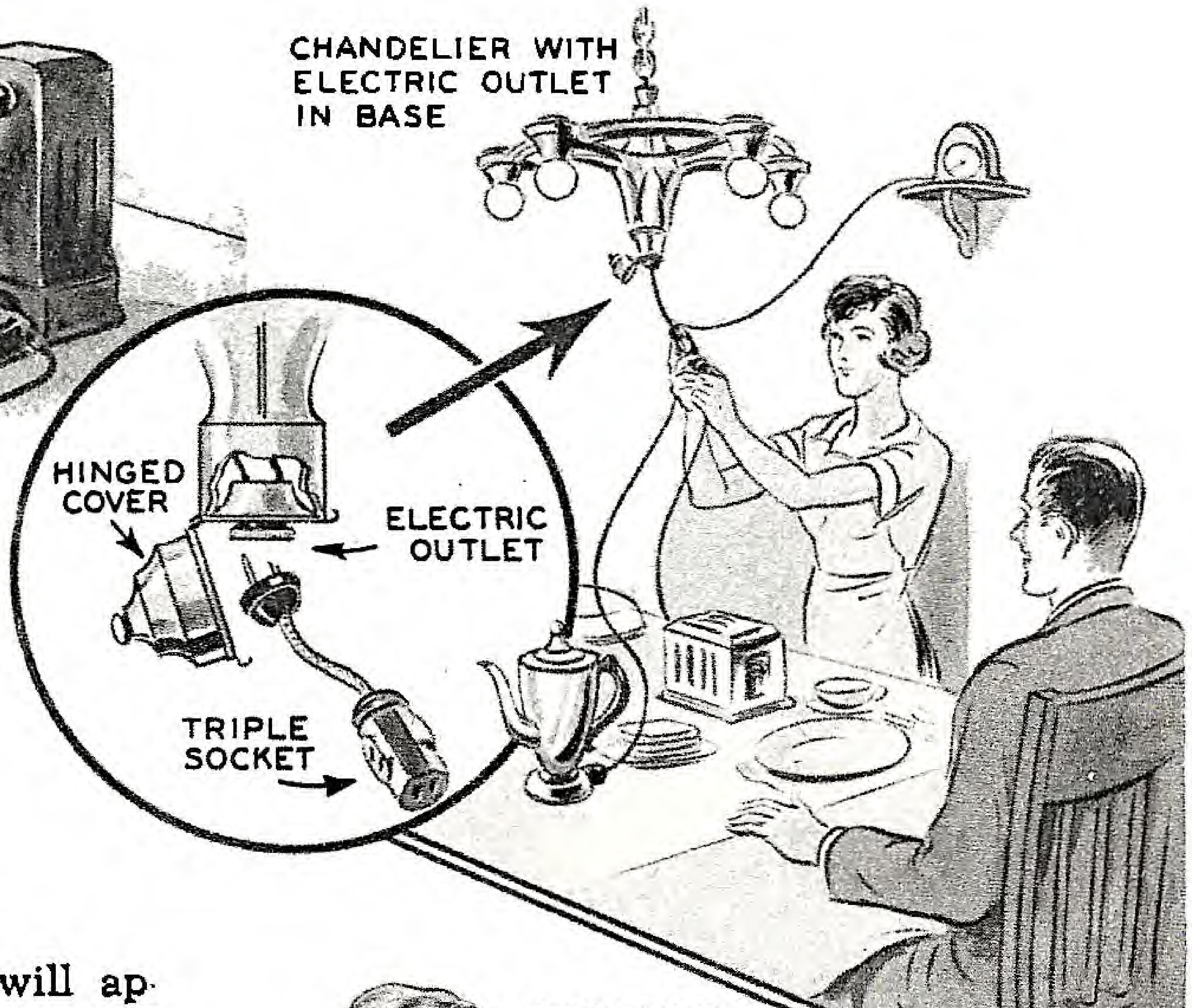
Trucks were turned into tanks by armoring them with boiler plate. Digging machines used for road making about the capital were used to dig trenches and earthworks. Loyalists used dynamite in a futile 70-day siege of Toledo's Alcazar.

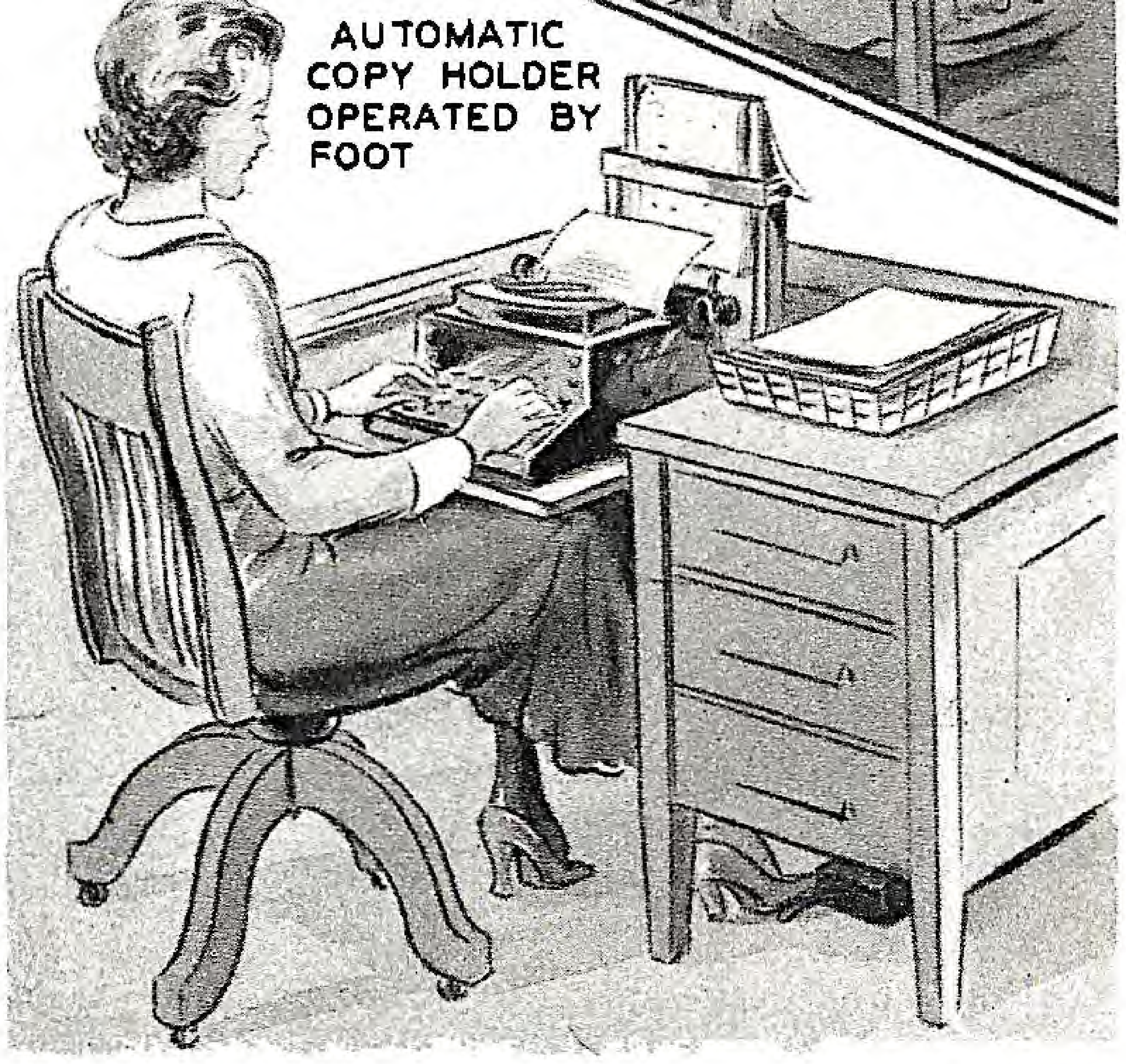


Armored cars like this were used by both sides in the battling around Seville in the first weeks of the bitter struggle.

WORKABLE IDEAS WIN PRIZES IN INVENTIONS CONTEST






AUTOMATIC COPY HOLDER OPERATED BY FOOT

Above—A telephone voice-volume control would aid thousands of persons with defective hearing. Top Right—Housewives would appreciate the convenience of a chandelier having a hidden electric outlet in its base to which table appliances could be connected. Lower Right—Typists would welcome a foot operated copyholder on which a metal guide would indicate the line to be copied.

PEOPLE with defective hearing will applaud the suggestion made by James J. Green, of Brooklyn, N. Y., which was awarded first prize of $25 cash in this month's Needed Inventions Contest. Mr. Green suggests that the telephone companies develop a volume control for general use on telephones.

The device, operated by a dial attached to the receiver, would serve to increase the power of the voice coming over the wire. Increased business for the telephone companies as well as invaluable aid to those who are hard of hearing would be the double benefits accruing from the device.

PRIZES

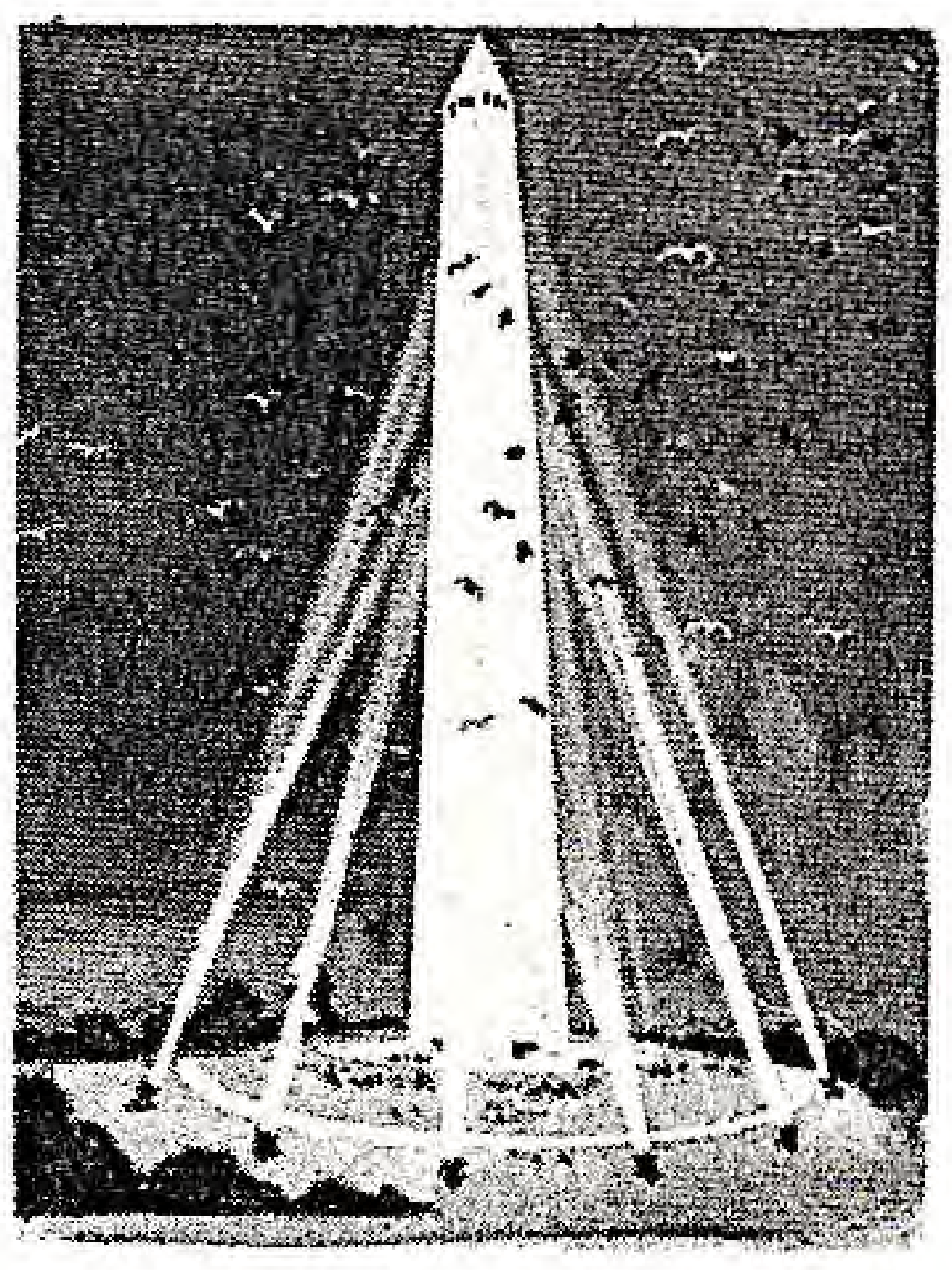
First Prize	**$25.00 in Cash**
Second Prize	**10.00 in Cash**
Third Prize	**5.00 in Cash**
Three Fourth Prizes	**2.00 each**
Four Fifth Prizes	**1.00 each**
Total—10 Prizes	**50.00 in Cash**

Miss Mabel Peete, of Columbia, S. C., won the second prize, $10 cash, by suggesting an automatic copyholding device for typewriters. The holder would feature a line indicator, operated by a bar going through the typewriter table to a foot pedal, that would drop to the next line of copy to be followed whenever the paper in the typewriter was moved up for spacing. Office workers would appreciate the device because it would save time, eyesight, and minimize copying errors.

Third prize, $5 cash, went to Herman C. Wagner, of Rochester, N. Y., for a suggestion of a dining room chandelier having an electric socket built into its base to which waffle irons, toasters, etc., could be connected. When not in use the socket would be hidden

[*Continued on page* 150]

PARAGRAPH ODDITIES
OF SCIENCE



Since installation of flood-lights around the Washington Monument several years ago, nearly 1,000 birds have met death by flying into the towering shaft.—W. H. Smith, Beloit, Wisconsin.

The distance between Europe and America varies as much as sixty-three feet in a single year. Lunar tides in solid earth are the causes.—Herman Clavenna, Herrin, Ill.

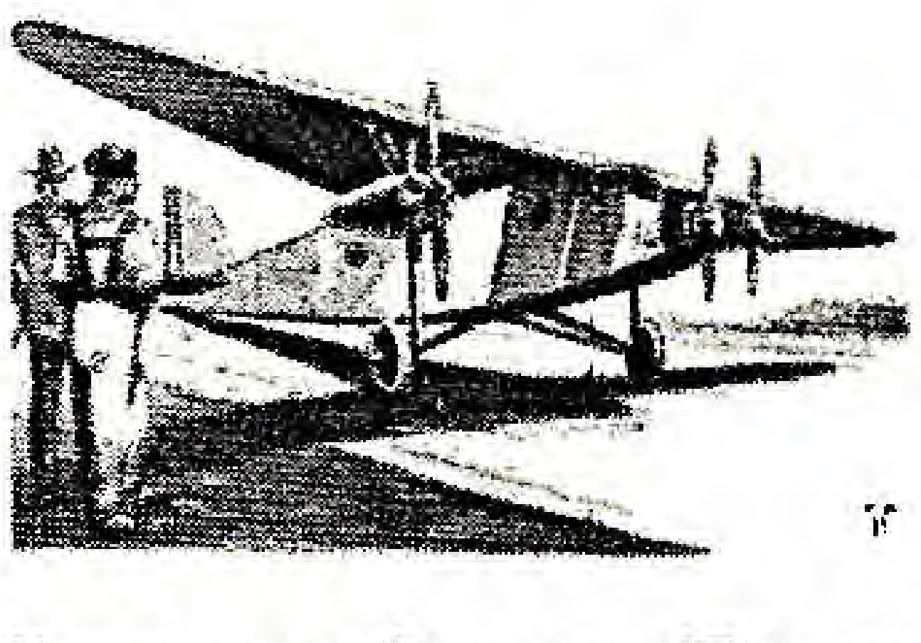
In the 14th century, sundials, sunglasses, and water clocks were preferred to watches and clocks because of their greater accuracy. Clocks of that period were considered good if they lost not more than two hours time per day.—Karl L. Martin, Cleveland, Ohio.

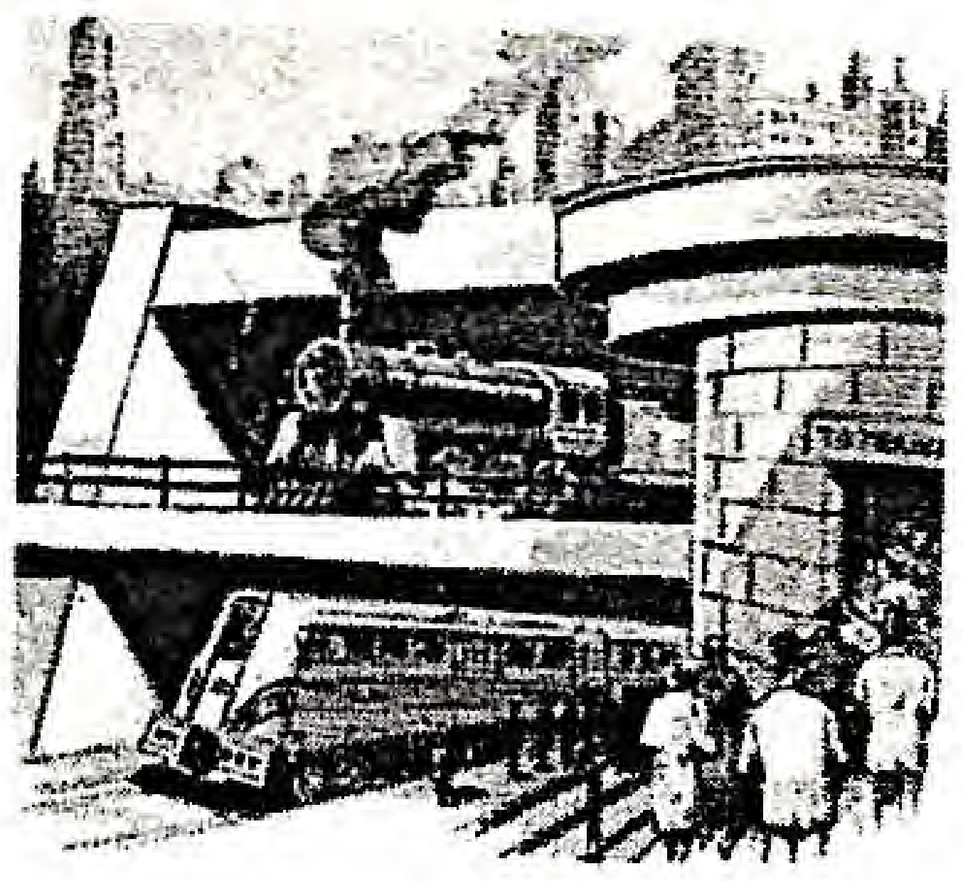
Fallacies that cranes and turtles live to be over 1,000 years old were contradicted by tests at the Uyeno Park Zoo in Tokyo, Japan. Tests showed that cranes live to about 50 years while the average life of a turtle was 40 years.—H. Kitana, Honolulu, T. H.

If a hole could be punched in a light bulb small enough to let in a million atoms of oxygen a minute, it would take one hundred million years to fill the bulb.—Will Milliken, Los Angeles, Calif.

If all the autos in the United States were laid end to end they would make a line that would extend a little over twice the distance around the earth at the equator.—John Miller, Jr., Chicago, Ill.

The famous "Southern Cross" airplane flew around the world equipped with propellers made of cotton. They were treated with certain chemicals and compressed into a substance possessing the strength of steel. —Cameron W. Jameson, Rochester, N. Y.





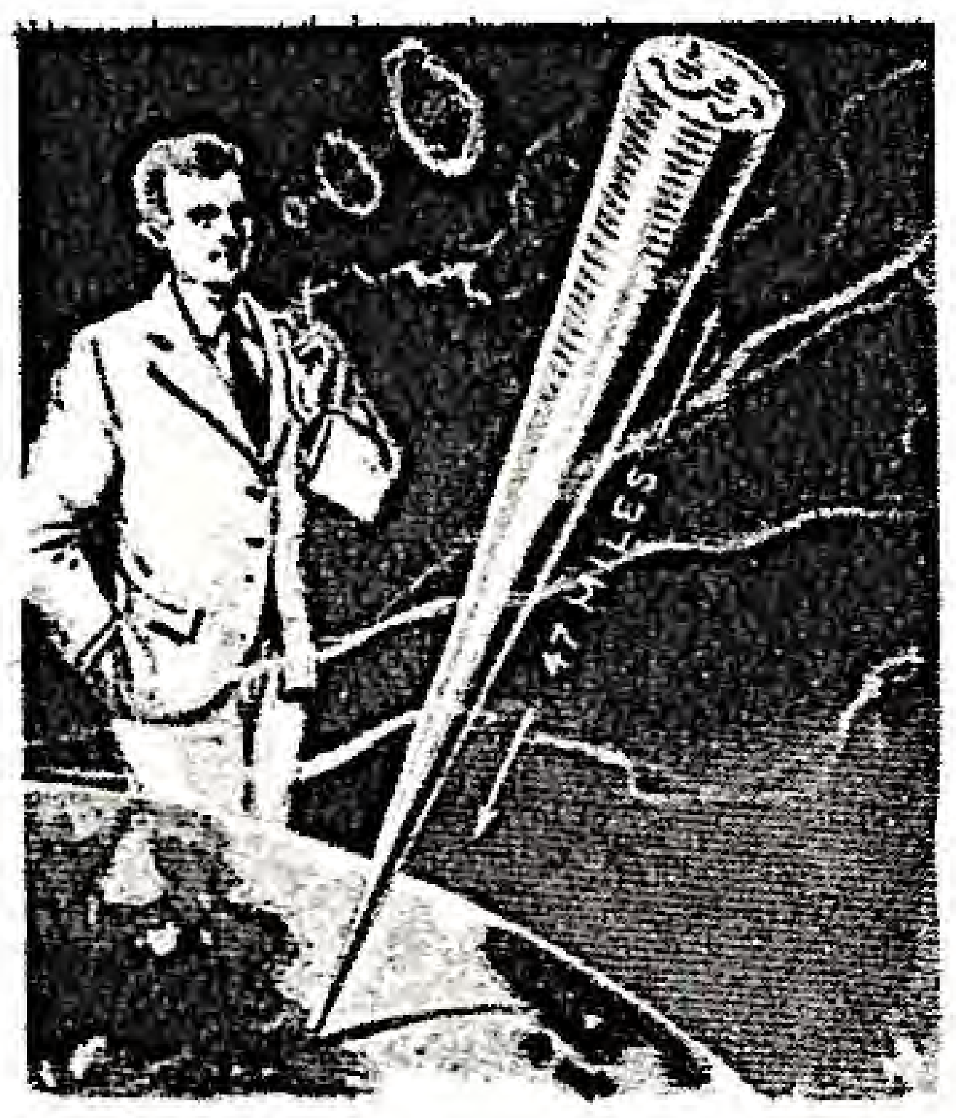
A train arrives in New York City every 52 seconds. 1,543 trains are handled daily by the two city terminals, and over 300,000 passengers are served daily.—William Zahauer, Brooklyn, N. Y.

New Brunswick, Canada, has a road that is high and dry at one time of day and under 12 feet of water at another time. The tremendous rise and fall of the water in the Bay of Fundy is the cause of this "disappearing highway."—Quillin Hutton, Brownwood, Texas.

An iron rod becomes longer when it is magnetized. Such a rod laid around the earth at the equator with its ends touching, would, when magnetized, overlap by 183 feet.—W. C. Wilhite, Edelstein, Ill.

If the energy in one ton of radium could be utilized in 30 years instead of being evolved at its slow rate of 1,760 years, it would suffice to propel a ship of 15,000 tons, with 15,000 h.p. engines, at 15 knots per hour for 30 years.—Sidney Gross, Jr., Saybrook Point, Conn.

The sun generates 624,000 horsepower for every square mile on earth. If this power could be harnessed, man would no longer need power houses for generating the power needed by industry.—Charles Masulis, Pittston, Pa.



If all the money spent for cigarettes in one year, in the State of Texas alone, was piled in silver dollars, it would extend upwards into the stratosphere for 47½ miles. —James Cottingham, Fairview, Montana.

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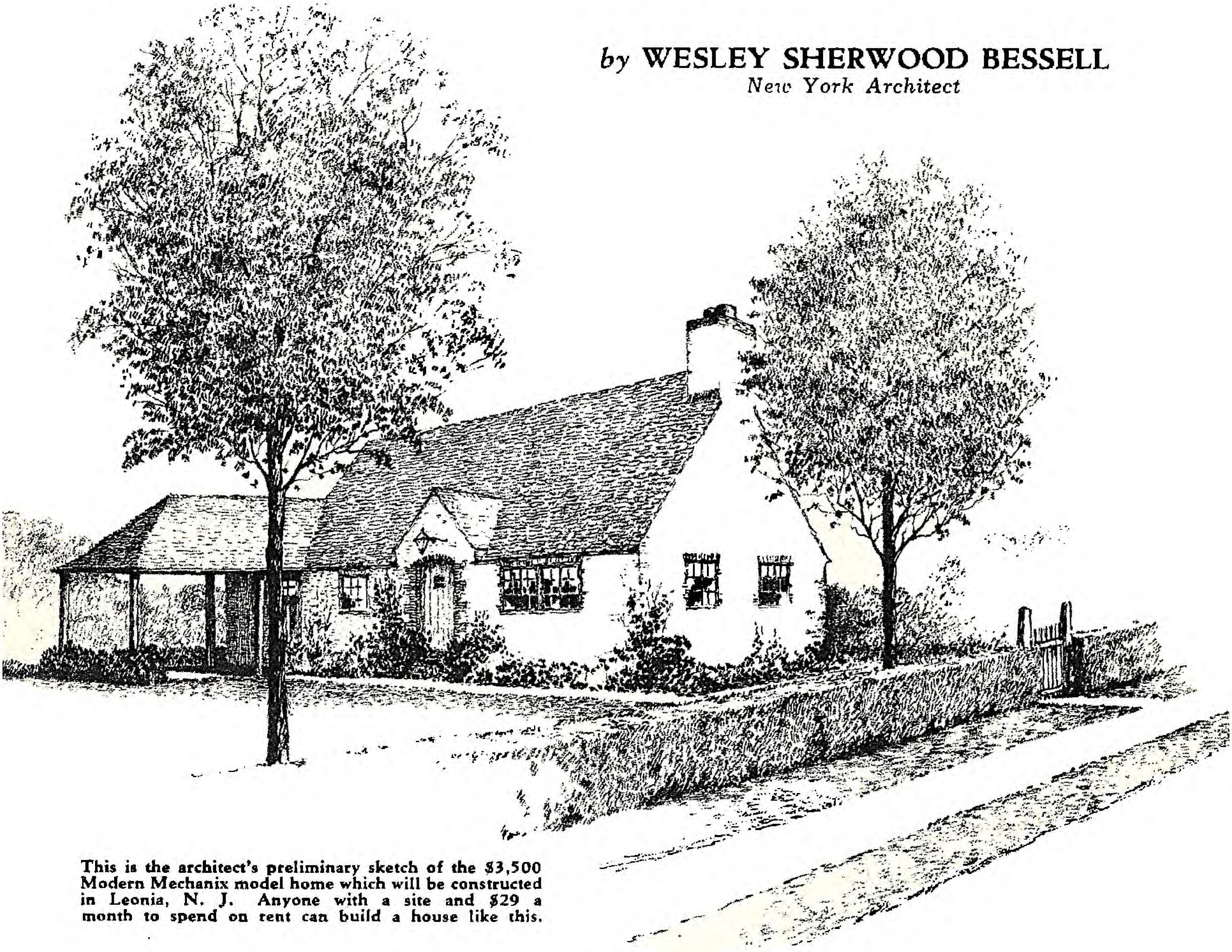
FLOOR PLANS *for*

by **WESLEY SHERWOOD BESSELL**
New York Architect



This is the architect's preliminary sketch of the $3,500 Modern Mechanix model home which will be constructed in Leonia, N. J. Anyone with a site and $29 a month to spend on rent can build a house like this.

WITHIN the confines of a delightful little office library, surrounded by books on architecture, sat four people, Tom and his wife and Bill and his Boss. They were discussing the problem of a new home. From that day when they had purchased their lot in the country, Tom's wife had been cutting out all sorts of pictures from magazines that had to do with the home. There were interiors showing fireplaces, cupboards, kitchen cabinets, refrigerators, bathroom fixtures, pine panelled walls, furniture, designs of doorways, gardens and garden furniture, also wallpaper patterns. These lay about on the library table, as bit by bit Bill's Boss drew out Tom and his wife as to just what they desired.

Tom was interested in the heating system. He wanted an oil burner, if they could afford one; his wife was more concerned about the kitchen. Could she have one that would make that part of the housework easy, small and compact, with some of those lovely looking cabinets in color, and complete in one unit, such as she had seen illustrated in the magazines? After some time, Bill's Boss suggested that a home such as they would like could be well planned all on one floor. Tom's wife thought this idea would be just wonderful, as it would be easy to keep tidy and clean, and no up and down stairs to worry about. Tom thought it might be hot living directly under the roof, but was reassured, when told the space under the roof could be insulated as a protection against heat and cold. Tom's wife wanted to know if the

MM MODEL Homes

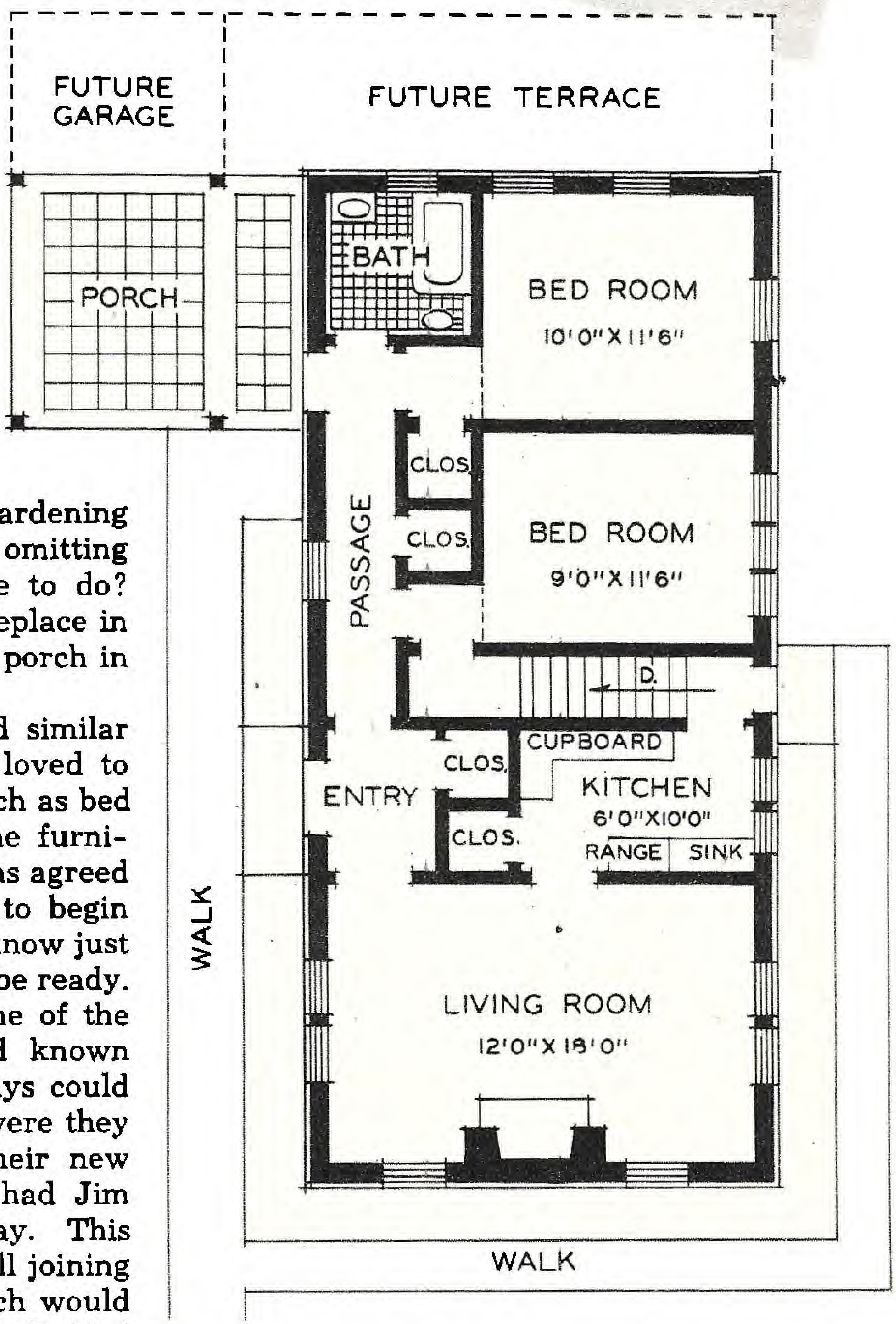
Careful Planning Provides Space for Present and Future Needs, Facilities for Play, Recreation and Entertainment Within Reach of Average Man.

space under the roof could be used for storage, and was pleased when told that it could, and that a disappearing stairway could be installed, and used only when necessary, that at other times it lifted up into the ceiling.

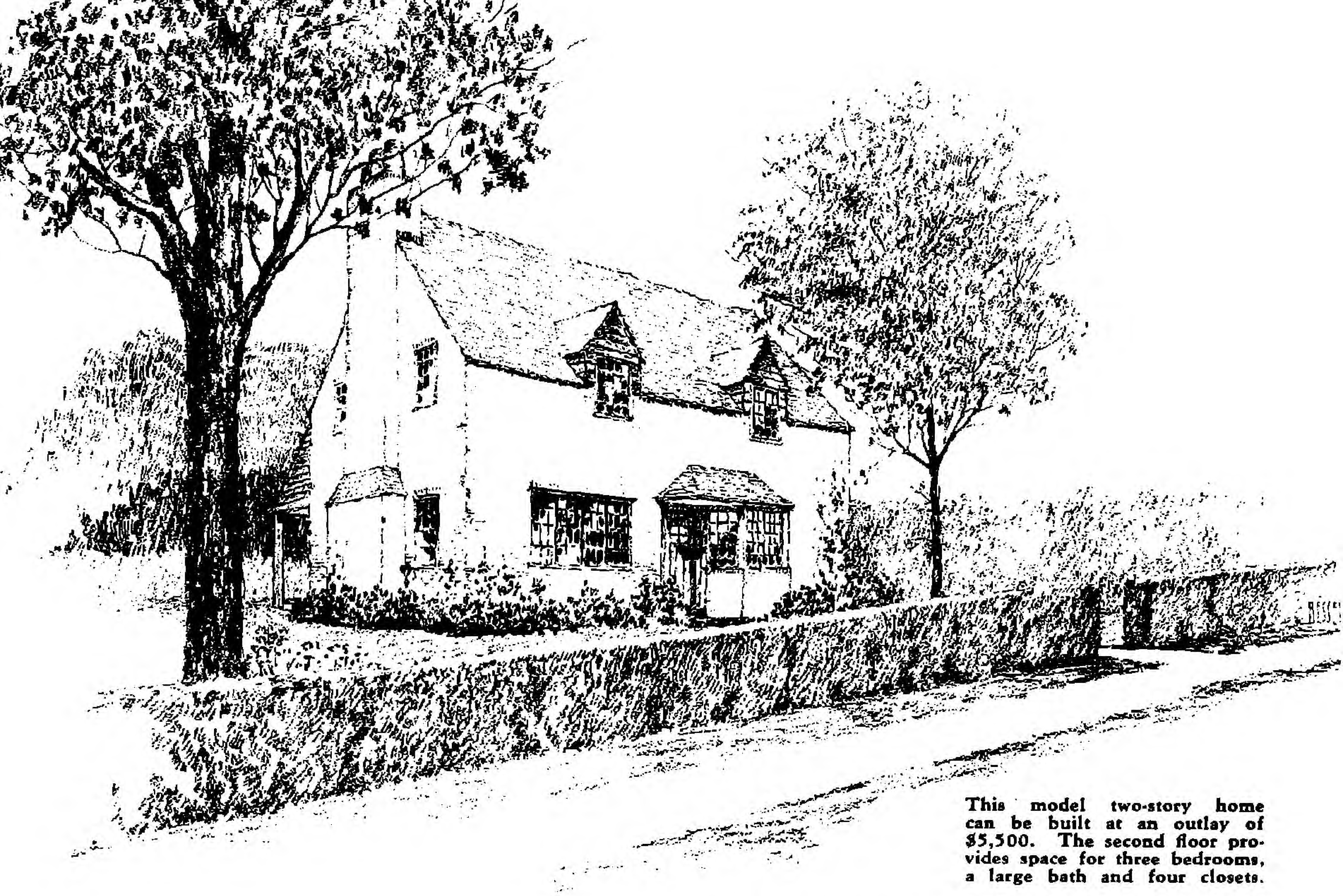
Both Tom and his wife were so excited about all the ideas advanced by Bill's Boss, simply because he seemed to read their every thought in planning for them the home they had dreamed would some day be their very own. Needless to say, he was only furthering their ideas in a more concrete and professional manner from the information they themselves had imparted to him, which, after all, was the result of his years of training and experience. He constantly jotted down notes, and asked questions as to their mode of living; did they play cards, like reading, did they entertain? They did play cards, and liked reading, but did not entertain so very much. Had they many friends, or relatives, that stayed over night with them? "No." What besides gardening and making garden furniture, not omitting amateur photography, did Tom like to do? "Sit and read in front of an open fireplace in the winter, or in a hammock on the porch in summer."

As for Tom's wife, well she liked similar things, including cooking; and she loved to make pretty things for her home, such as bed spreads, curtains, slip covers for the furniture, and lamp shades. Finally, it was agreed that Bill's Boss had sufficient data to begin his sketches, and he would let them know just as soon as possible when they would be ready. Tom and his wife departed after one of the most exciting two hours they had known since their wedding day, and for days could not contain themselves, so anxious were they to see the plans and picture of their new home. Wisely enough Bill's Boss had Jim and his wife come in on another day. This was done to avoid the confusion of all joining in the discussion as to just what each would like, and neither couple getting undivided attention.

Jim's and his wife's tastes were different



Floor plans for the $3,500 model home are arranged to permit possible later additions of a garage and terrace to the arrangements. The house contains two ample bedrooms.



This model two-story home can be built at an outlay of $5,500. The second floor provides space for three bedrooms, a large bath and four closets.

from those of Tom and his wife, and again the same questions were gone over, and their particular likes and dislikes noted by Bill's Boss. Jim's wife, because of the children, had not had the time to cull over the different ideas in the magazines, but she knew what she wanted for a home. A house painted white, a bathroom finished with colored tile and fixtures to match; a bay window somewhere in which she could put flowers during the colder months; a gas range in color with a broiler oven, and a place to keep the dishes hot, because of the baby. These and many other small details were given to Bill's Boss as ideas for their home. Jim's main concern was a place for his lathe. After that he would, he knew, be satisfied with anything that his wife liked. Oh, yes, he had a car, and must have a garage. "Do you prefer one attached to the house, or not?" "It does not matter much." "Well, a detached garage will not detract from the architectural dignity of your house, and there is less chance for gasoline odors getting into the house." "Fine," said Jim, "I'll have mine detached." So the final conclusion was that Jim and his wife must have a two storied house with living room, dining room and kitchen on the first floor, and three bedrooms and bathroom on the second floor. With this settled they left, but as a parting shot, Jim said, "Please, don't forget my lathe."

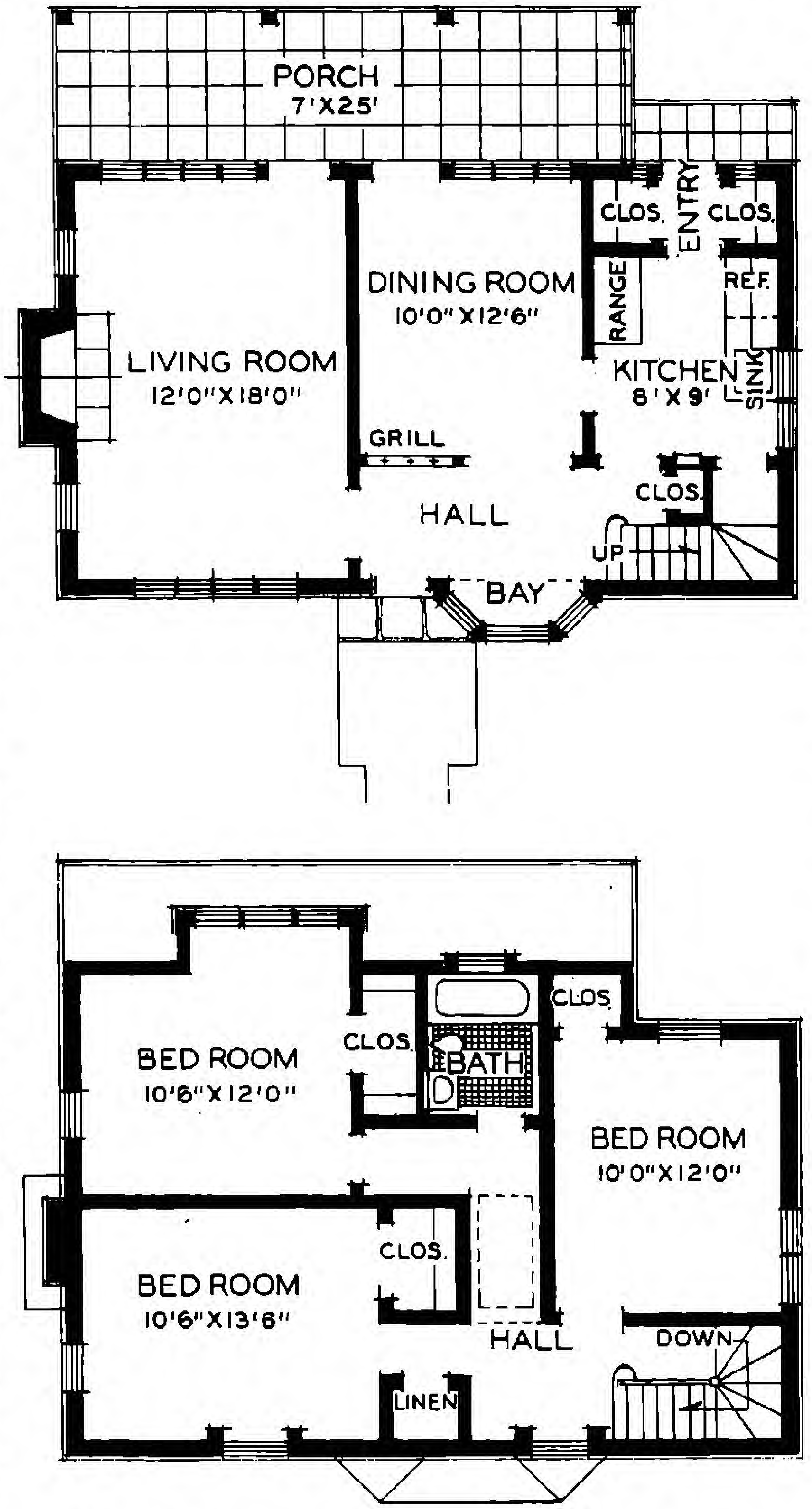
After a week that seemed all too long, Tom and his wife were informed by Bill that if convenient they could stop at the office the next day at two o'clock. Promptly at that hour they arrived, and were shown the plans and a perspective, or picture of their home-to-be. Both were pleased beyond their fondest hopes, for before them was a lovely cottage type of home, made of whitewashed brick, at the front end was a tall chimney, while on the side was the main entrance and an open porch. And, if they ever became the owners of a car, provisions were made for building a garage, without upsetting any part of the design. The garage would be detached, but still could be reached under cover.

The plan was so arranged, with due regard to the points of the compass, that all the bedrooms would be sunny and bright during the cold winter days. The house was placed along the narrow way of the lot, and would afford them the greatest garden space. With the little brook running across the front and down the side property line, Tom saw visions of some grand flowers. Tom's wife felt that she would like a little different arrangement in the kitchen and bathroom, and after discussing these points, was informed that the changes could easily be made. So much closet space in such a small house seemed unbelievable. But wasn't it marvelous how much more interesting it was to build a home after your own ideas, instead of just picking one out of a row of houses all looking about the same, and lacking individual study of one's own requirements.

"Now," said Bill, who had taken charge of the situation, "you may take these sketches home; go over them very carefully, jot down any criticisms and suggestions you desire, and then return them, so that when we start the working drawings, we can incorporate the suggested changes in the finished drawings." Both Tom and his wife didn't think any changes would be made, and wanted Bill to go right ahead with the working drawings, which he said he would do, but insisted that they take the sketches home, and live with them for a few days. So with the plans and perspective, also a plot plan showing how the house would fit on the property, tucked under his arm Tom and his wife left the office with the understanding that when they returned they would then be expected to sign a contract with Bill's Boss as their architect.

When Tom and his wife called at the office, after having carefully gone over their plans, and were ready to proceed, Bill placed before them a contract that was to form the basis of agreement between them and the architect. This form of contract was the one issued by the American Institute of Architects, which is used by all architects who are members of the Institute, and recognized as the best in the architectural profession and practice. The agreement states briefly the following: Just what agreed percentage the owner will pay the architect for his services; of what the architect's services consist, which includes the preparation of preliminary studies, working drawings, specifications, detail drawings, drafting of forms of proposals and contracts, issuance of certificates of payments to contractors, keeping accounts, and the general supervision of the building.

"About the last," said Bill, "let me say that supervision is of vast importance. For by supervision an architect can prevent the use of inferior materials and poor workmanship, and can save the owner many headaches."



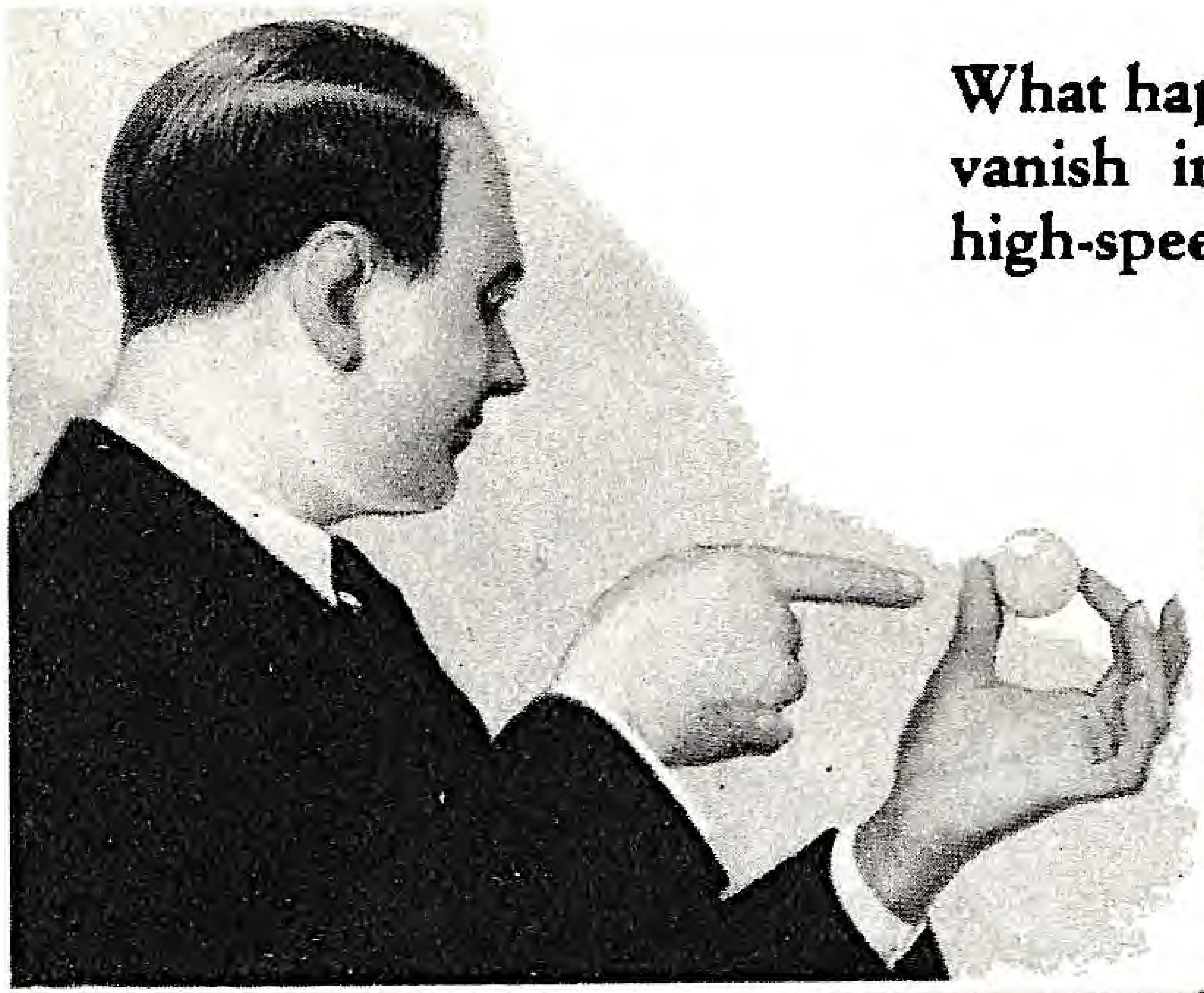
These floor plans show arrangements of the two floors of the $5,500 model home. The lower floor provides space for a large dining room and an ample living room.

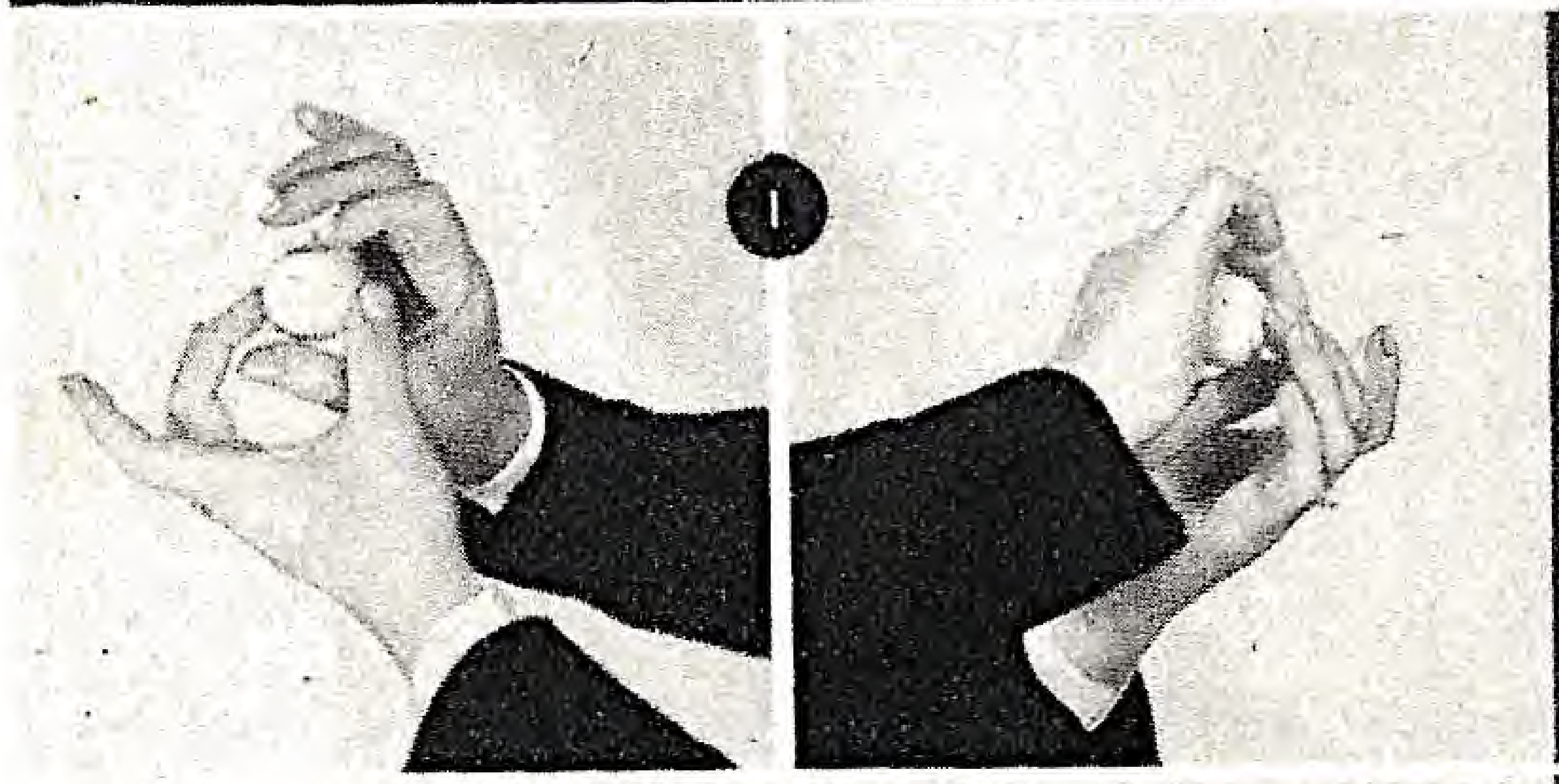
Speaking of contractors, it is well to know something of their reputation and standing in the community where your estimates are obtained before the contract is awarded. "So I will ascertain from sources at our disposal that your contractor is of the better type. This is an assurance of good workmanship and the best materials being used." After the contract between Tom and the architect was signed, Bill brought out the rough draft of the quarter-inch scale drawings, and then took up with them numerous questions, such as the location of lighting outlets, base plugs, and bells; location of radiators, and the type of same; also if Tom preferred the unit kind of oil burner, which is self contained, or the regular coal

[*Continued on page* 130]

CAMERA is QUICKER Than the HAND

What happens to a golf ball when it is made to vanish into thin air by a magician? The high-speed camera lens reveals the secret.





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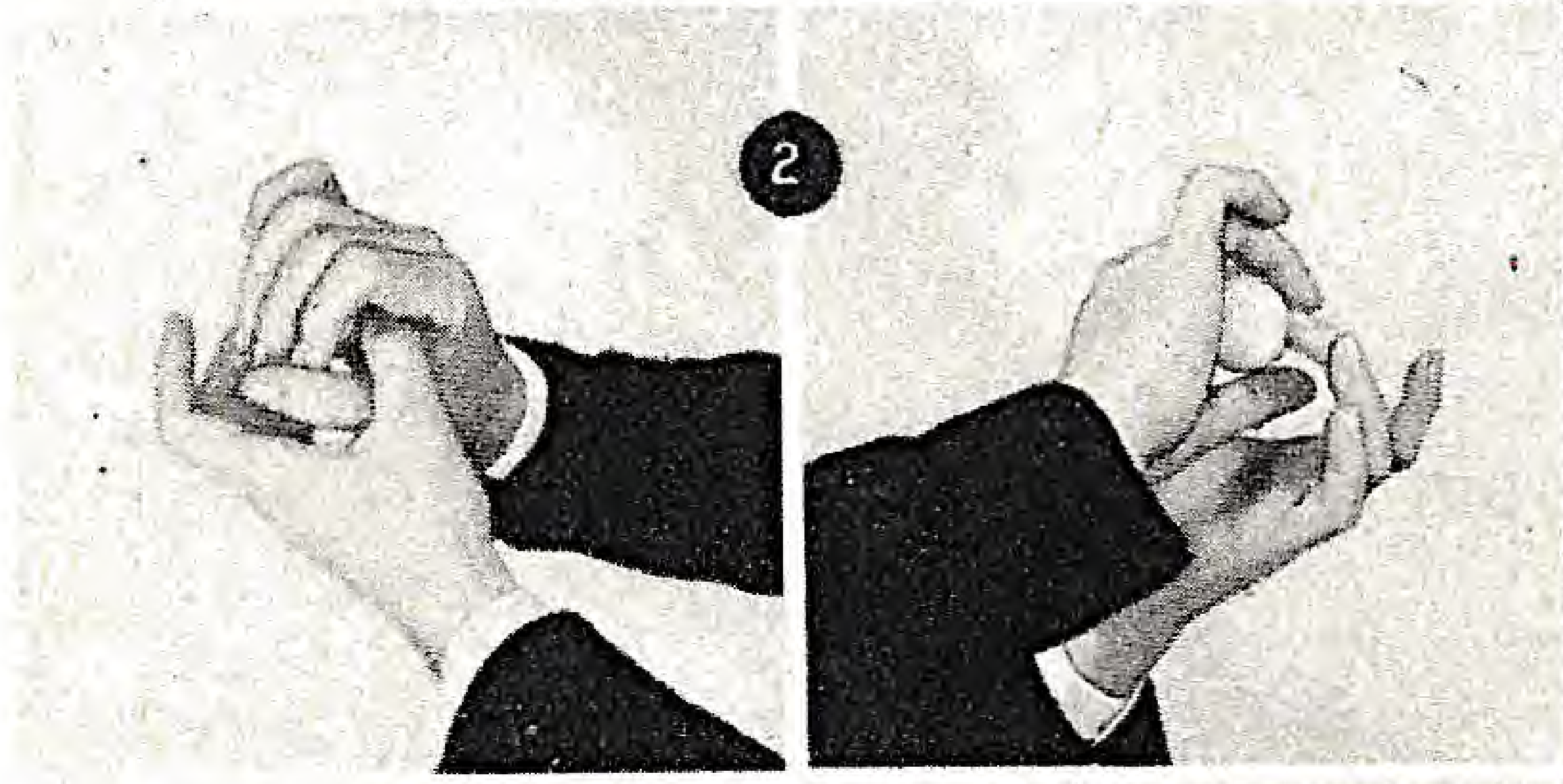

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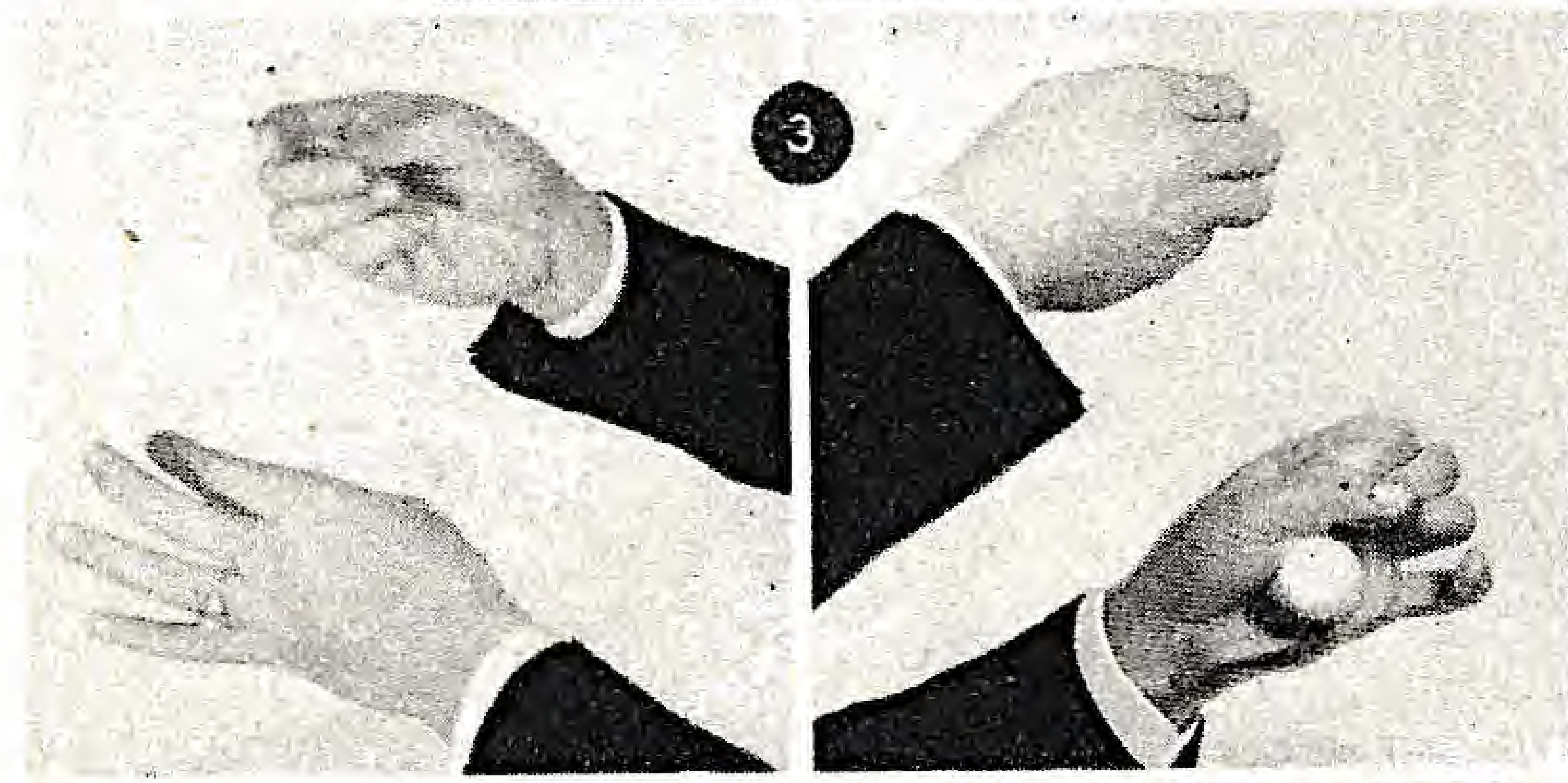

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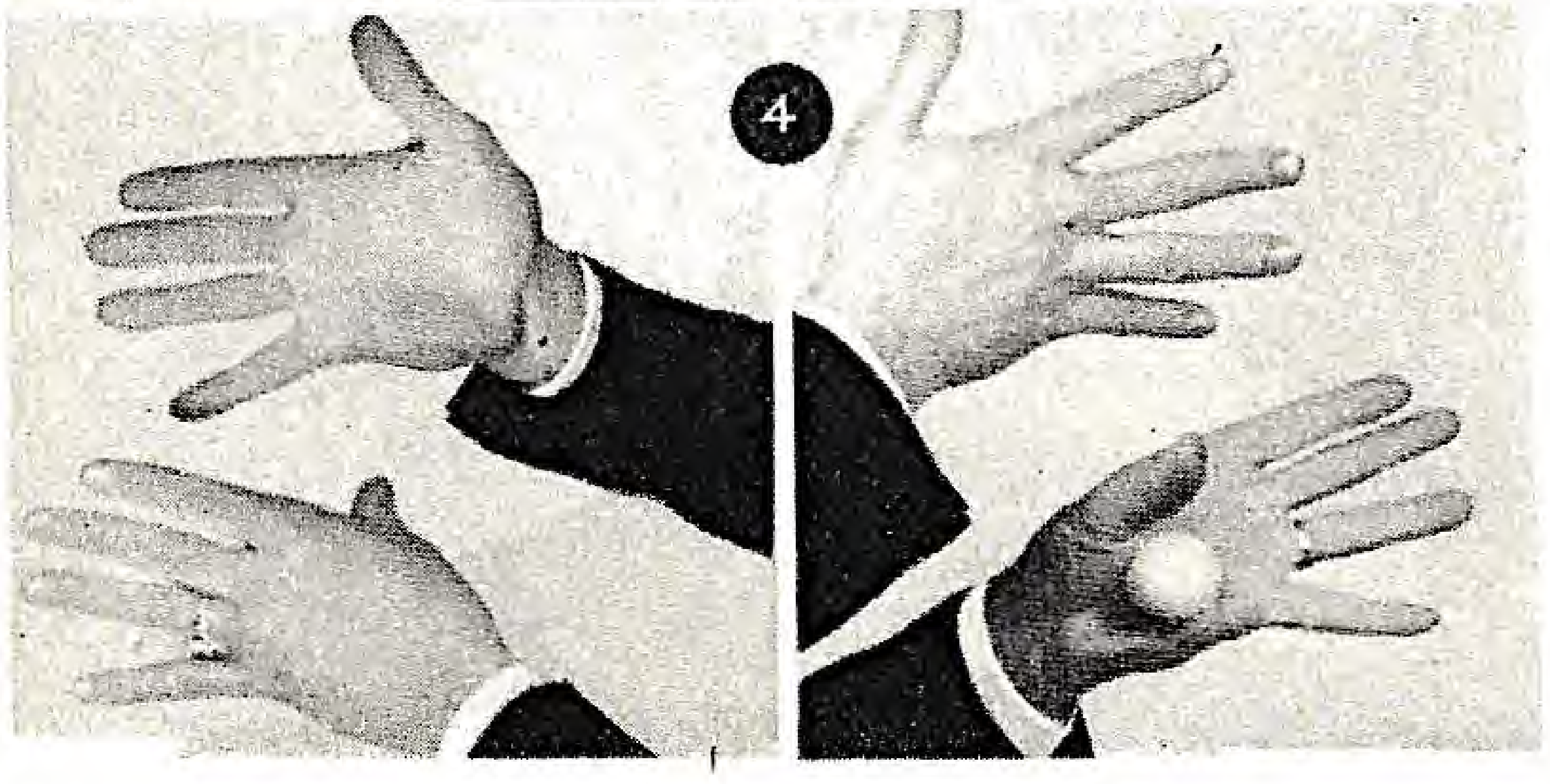

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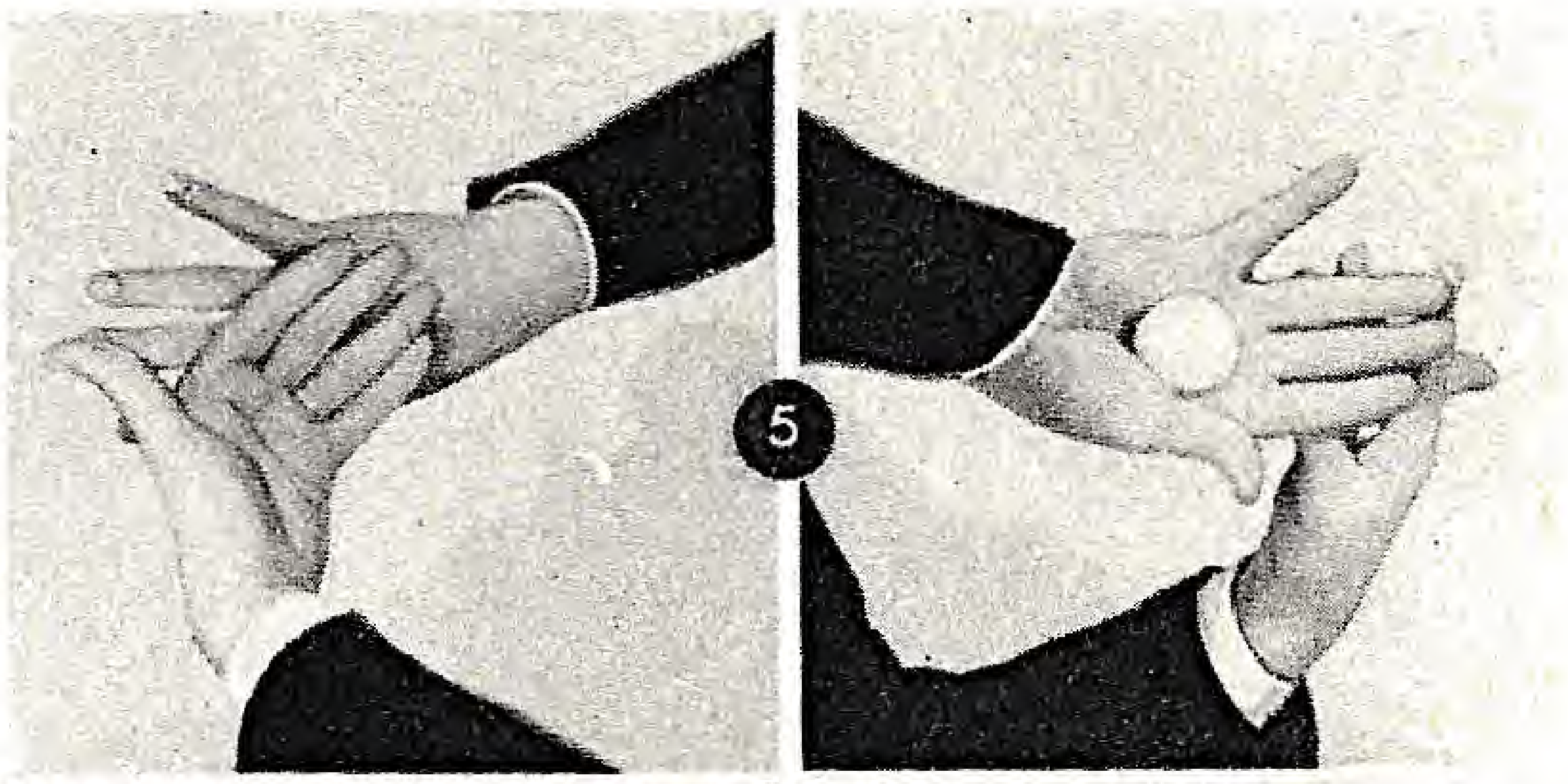

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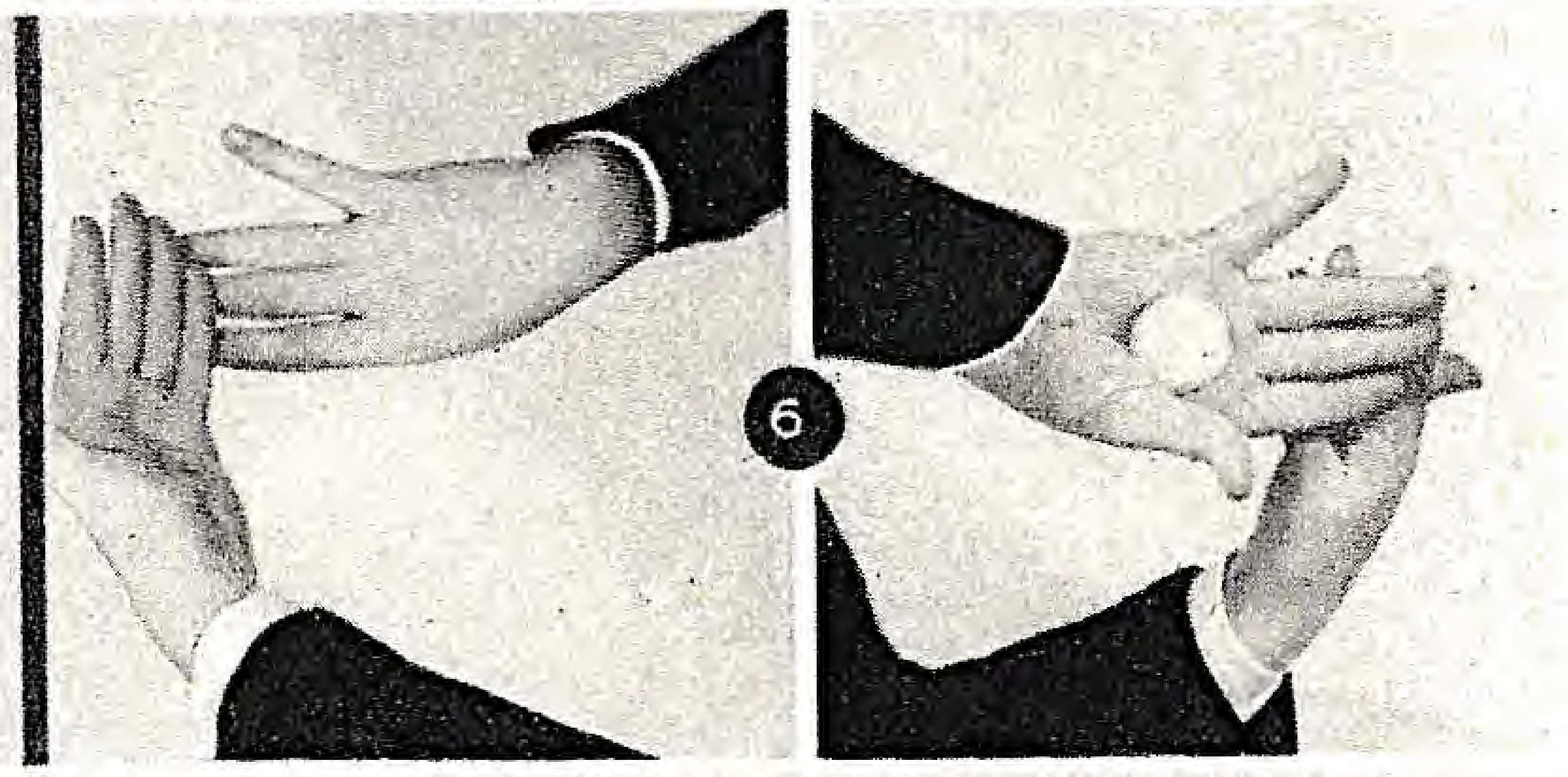

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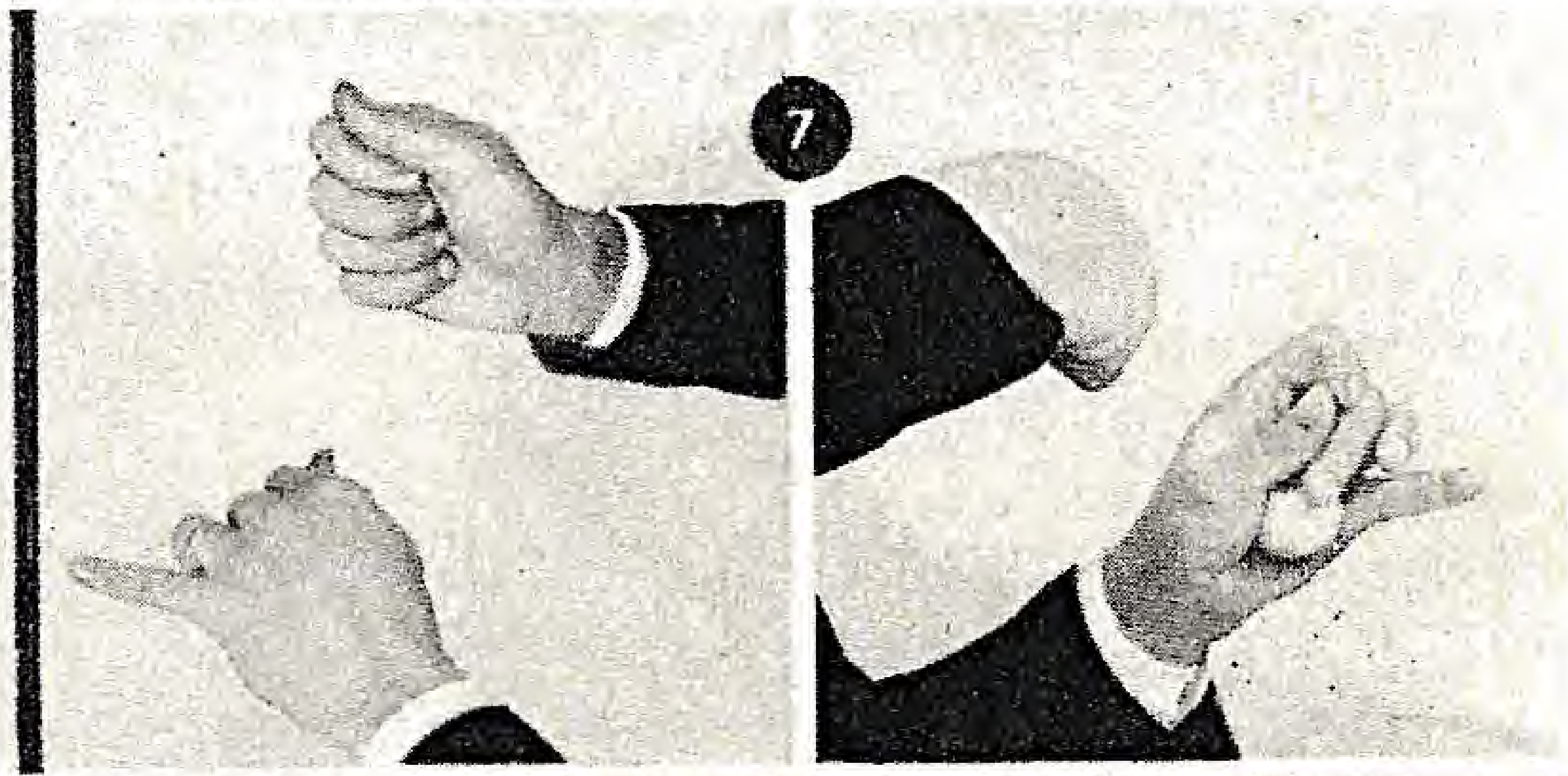

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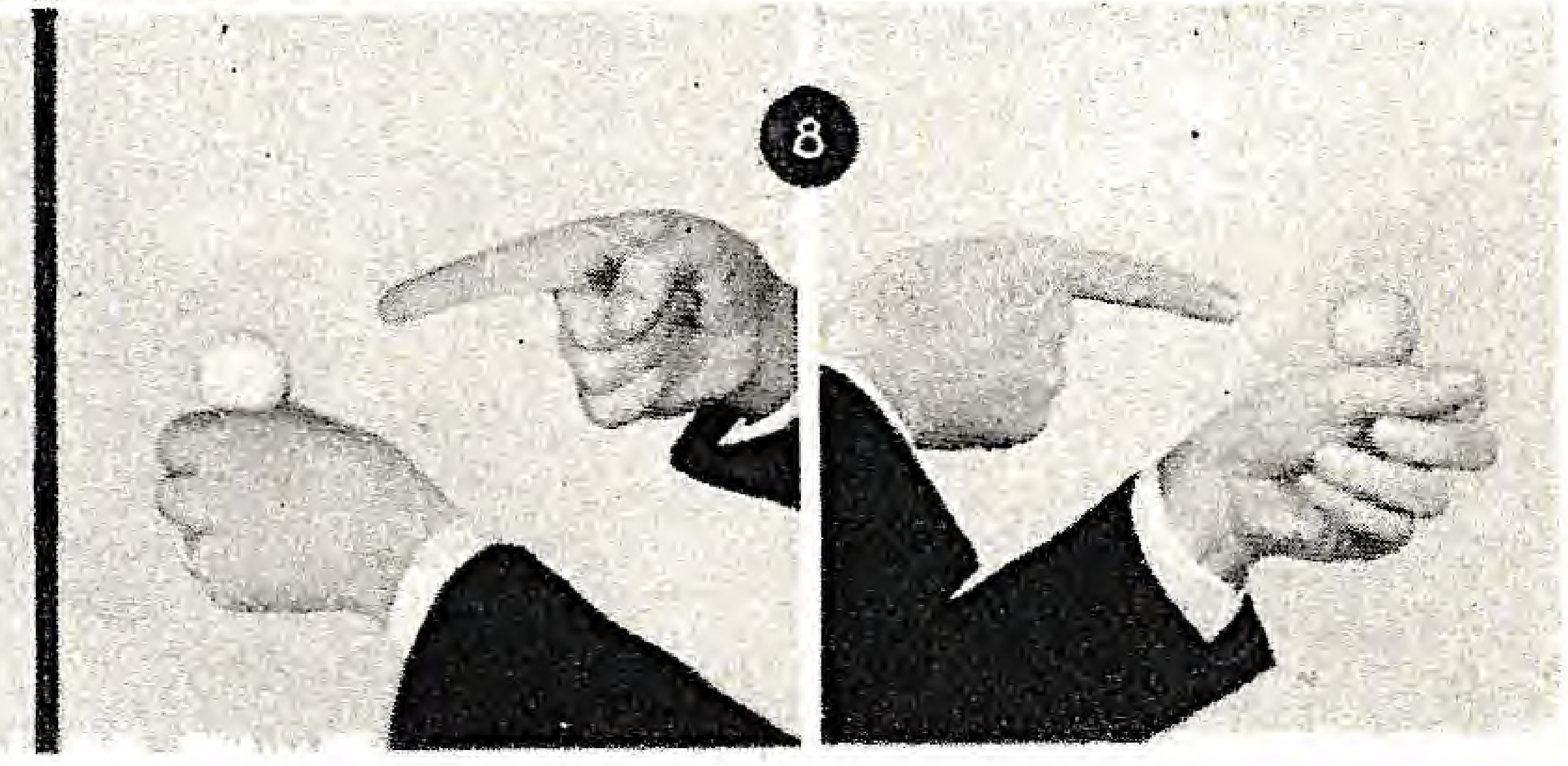

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WHEN Henry Gordien, a magician, decided to perform a golf ball vanishing illusion before George Ryan, a Minneapolis, Minn., newspaper photographer, he picked the wrong person. Armed with a high speed camera Ryan photographed the magician's sleight-of-hand movements from both sides. When the films were developed the whereabouts of the mysterious golf ball was plainly visible in the pictures. The way in which the audience see the trick is shown in the lefthand pictures. The candid pictures opposite these show you how the illusion is really performed by magician's fast fingers.

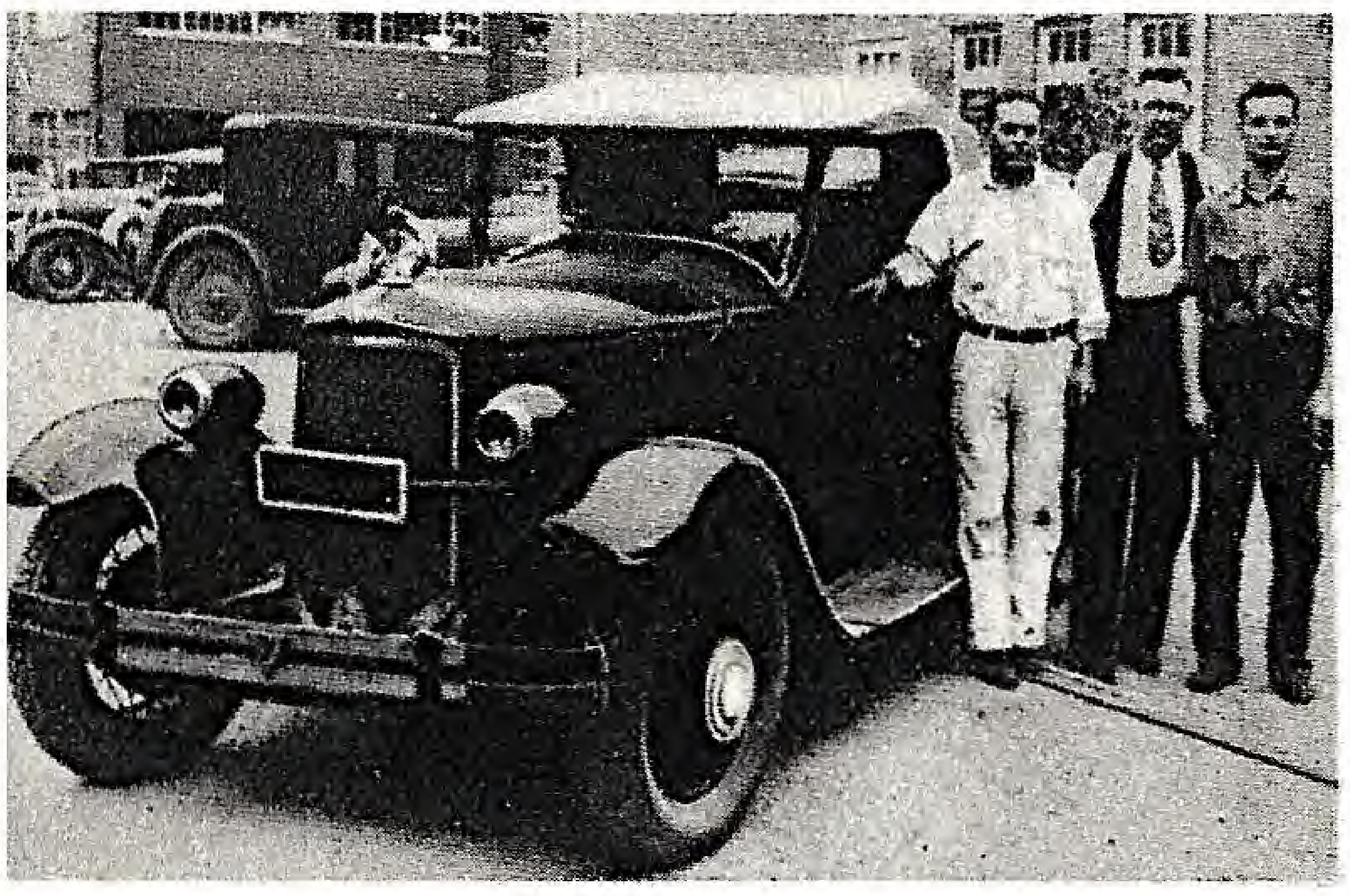
Prefabricated Home Erected At Wisconsin Exposition

THE adaptability of the prefabricated wood panel system in the erection of homes of more than one story and of conventional architectural design was demonstrated at the Wisconsin Centennial Industrial Exposition at Madison, Wis. The Forest Products Laboratory, U. S. Department of Agriculture, exhibited a one-fourth section of a house so constructed.

The house section was assembled by four carpenters within two working days through the use of prefabricated units. The standard width of panels used in the home was four feet. All floor, roof, and wall units were constructed of plywood glued to framing. This allowed for a great reduction in thickness and weight without any reduction in strength.

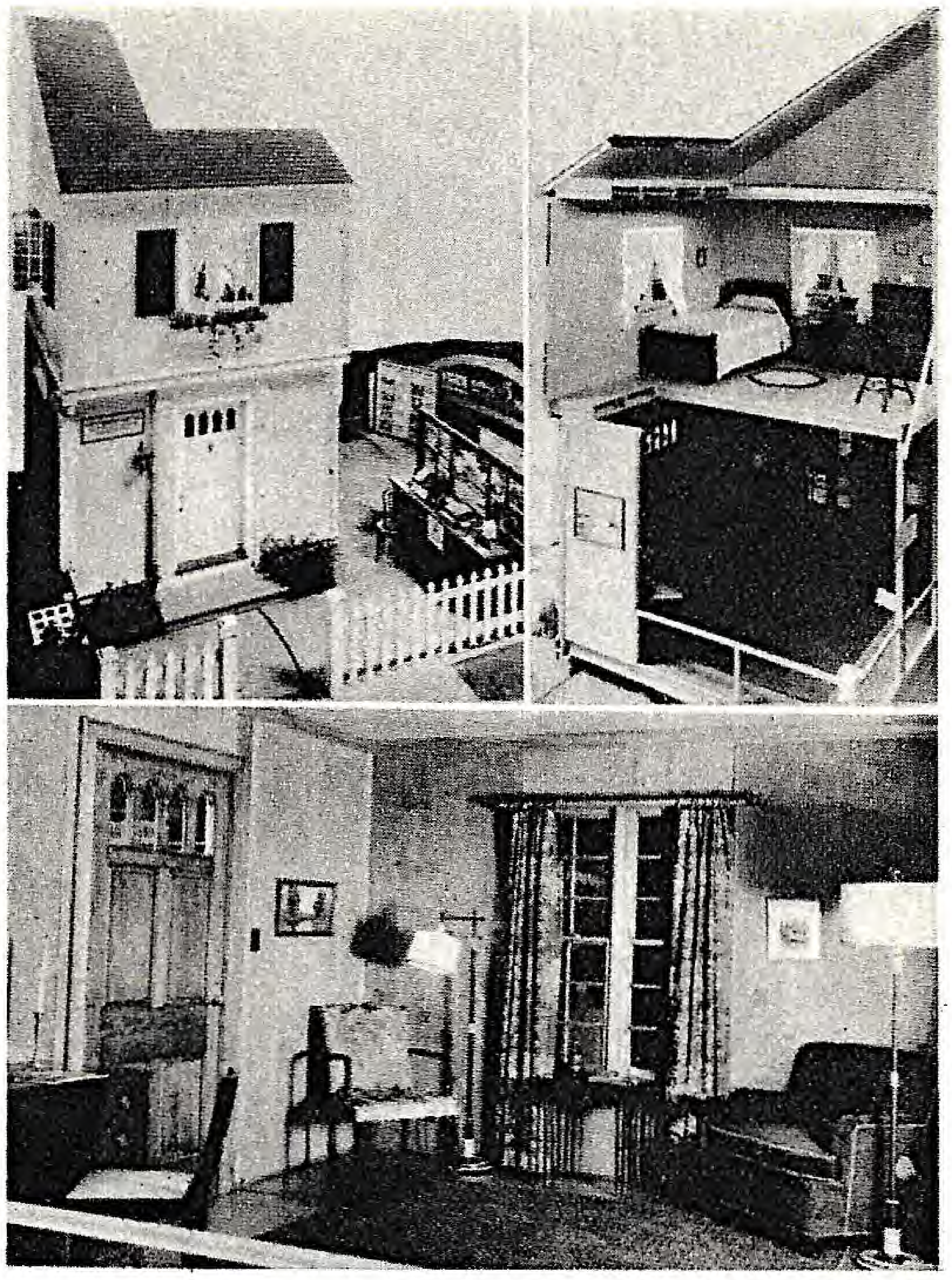
The prefabricated house featured a sloping roof with shingle covering, an attic assembly, double hung windows, and hardwood faced plywood for interior walls and floor wearing surfaces. The sectional house display with its construction details and interior furnishings attracted inquiries from 20,000 exposition visitors.

Auto Made Of Parts From Wrecks



This auto is made of parts taken from 25 wrecks in which 37 people were killed. Ben Preston, center, of Wichita, Kansas, built it with the aid of Ray Witt, left, and E. D. Frazee.

USING the sound parts of 25 autos that were wrecked in traffic accidents resulting in 37 deaths, Ben Preston, a Wichita, Kansas, auto mechanic assembled a serviceable auto for personal use. The parts of the unusual car came from wrecked autos of many types. A few parts came from the cars of gangsters wrecked while fleeing from police pursuit.

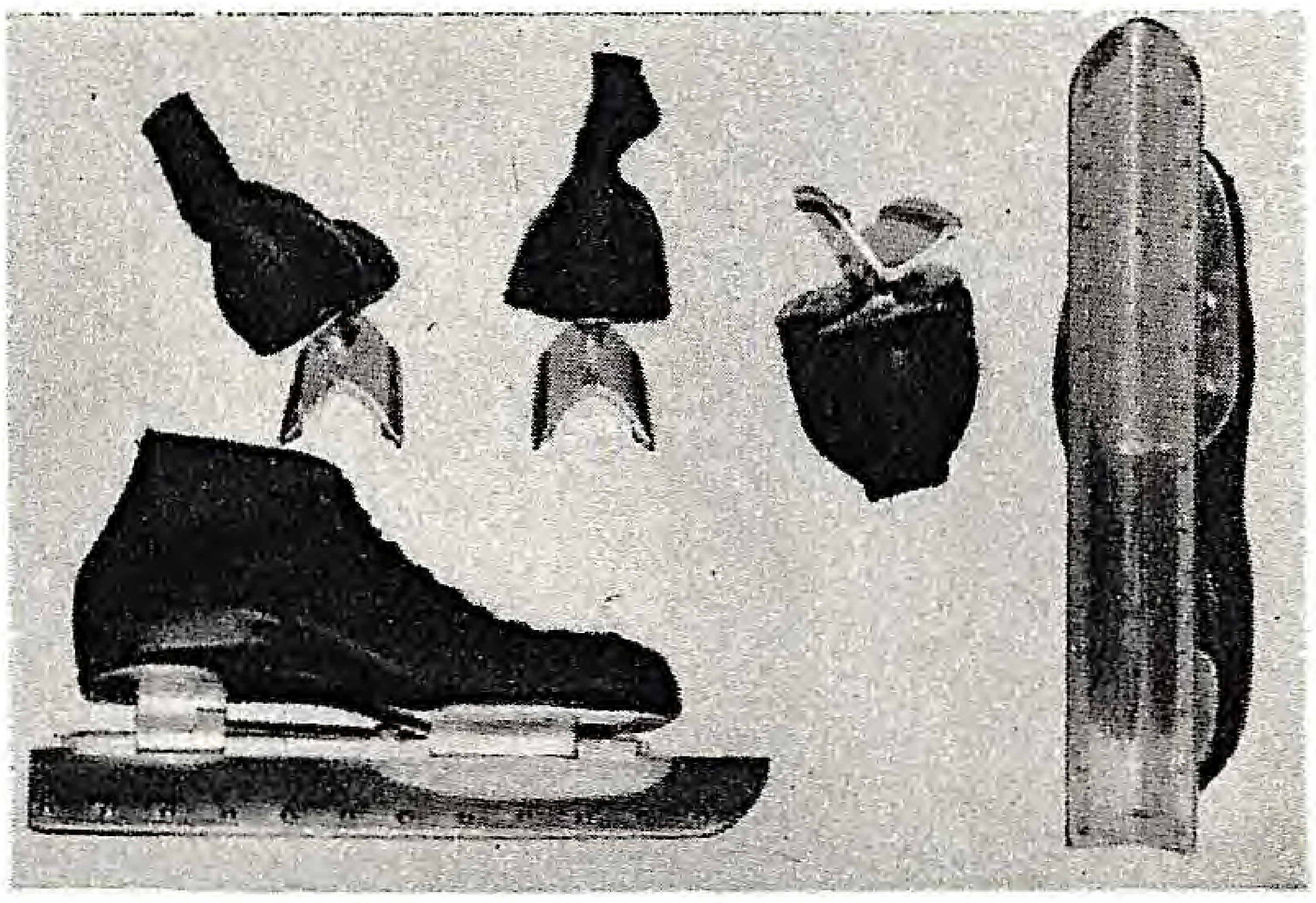


Upper left—Exterior of prefabricated house section erected at Wisconsin Centennial Exposition. Upper right—Cut away section showing construction. Bottom—Plywood floors and walls are light, but possess unusual strength and stability.

Novel Ice Skate Eases Ankle Strain

DESIGNED to eliminate 90% of the ankle strain involved in ice skating, a new safety ice skate inclines freely to any angle and is guided by the lean of the skater's body. The skate has two blades pivoted from the center of a shoe on monel metal shafts.

Ottmar Kaub, of St. Louis, Mo., the inventor, claims use of the skates makes slipping on fast turns impossible. The duraluminum metal skates are rust and tarnish proof.

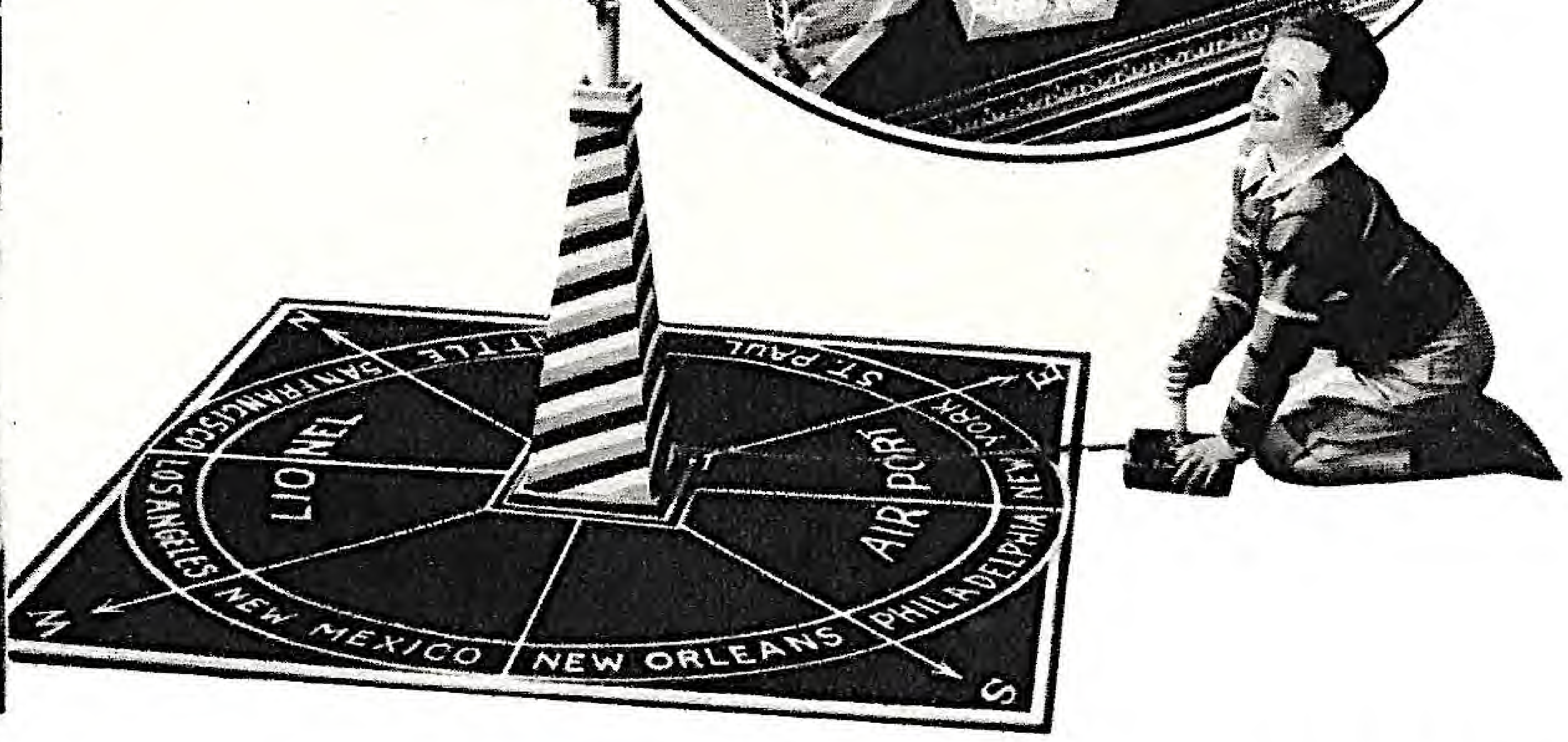


To relieve ankle strain this two bladed ice skate inclines freely from side to side as skater leans. A concealed equalizing spring returns the skate to proper position when foot is raised.

For the amateur scientist this Micro-photography outfit is the ideal gift. Permanent records of all experiments can be kept on photographic prints. The microscope and the camera can be used independently.

CHRISTMAS

Cellulose wrappings add much to the appearance of gifts. At right are examples of what attractive wrapping will do. Below—This toy airplane will thrill any youth who receives it. Plane performs like a real ship.


LIONEL
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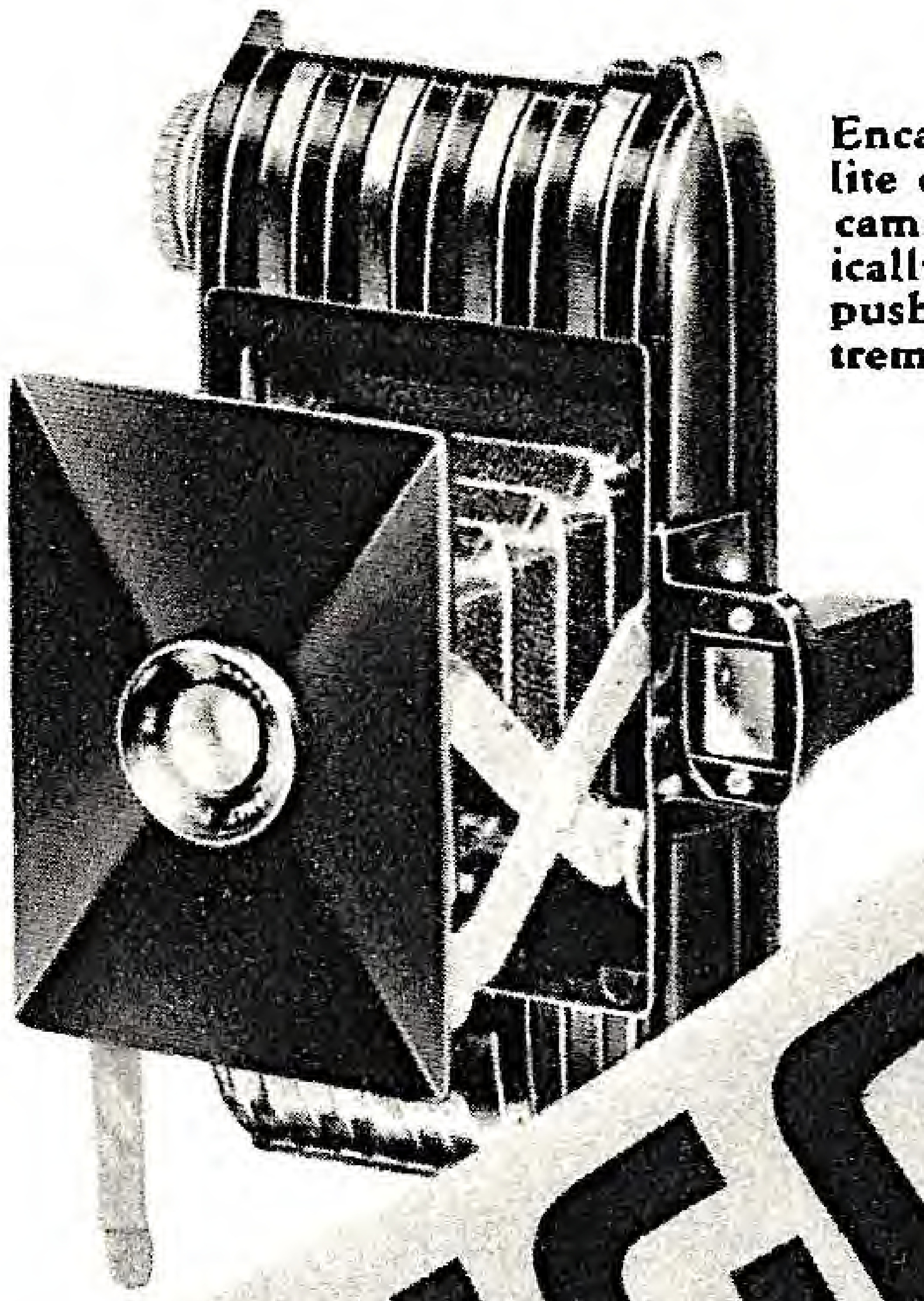
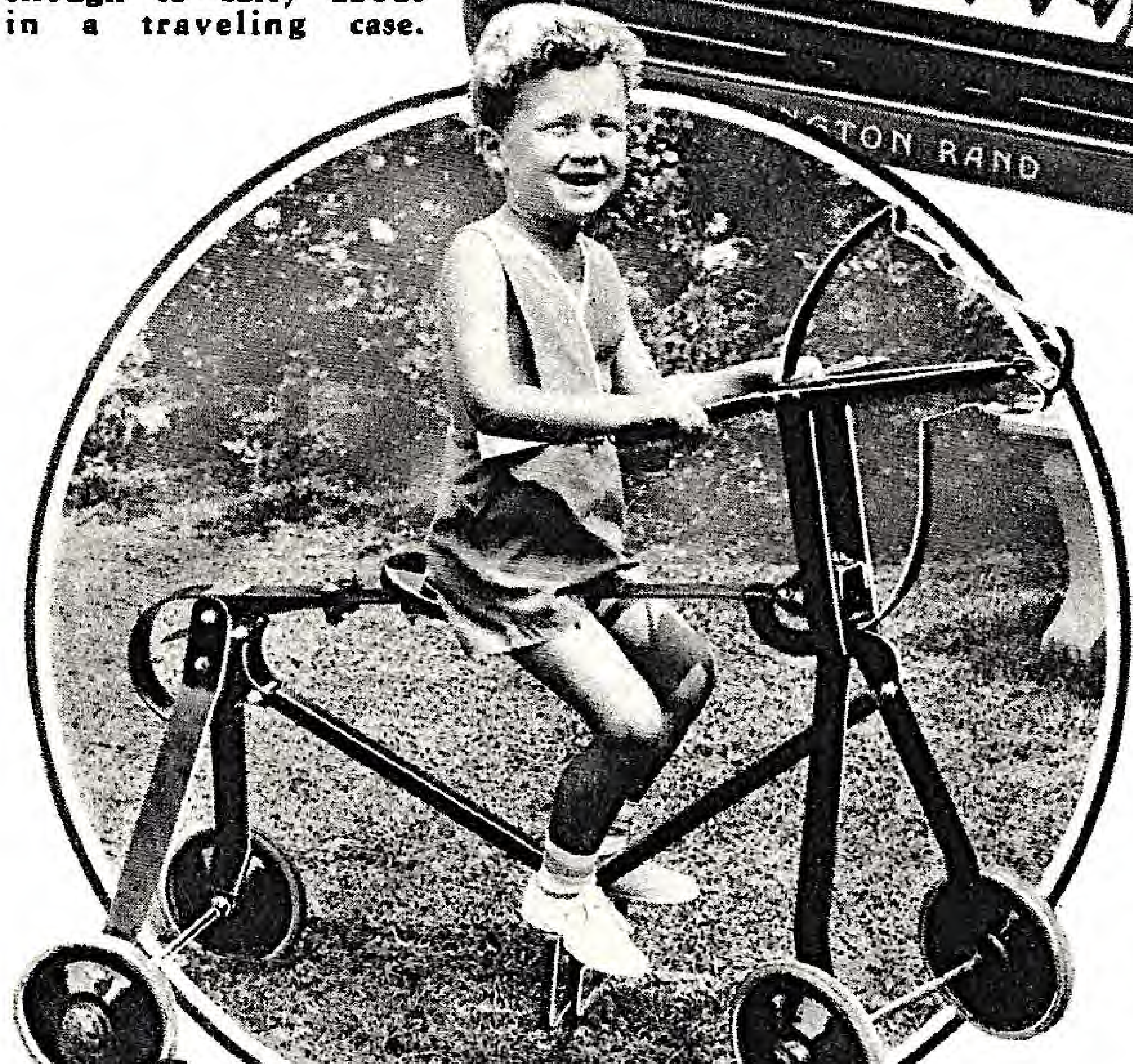


Encased in a neat bakelite case this handy purse camera opens automatically when a button is pushed. It takes extremely sharp pictures.

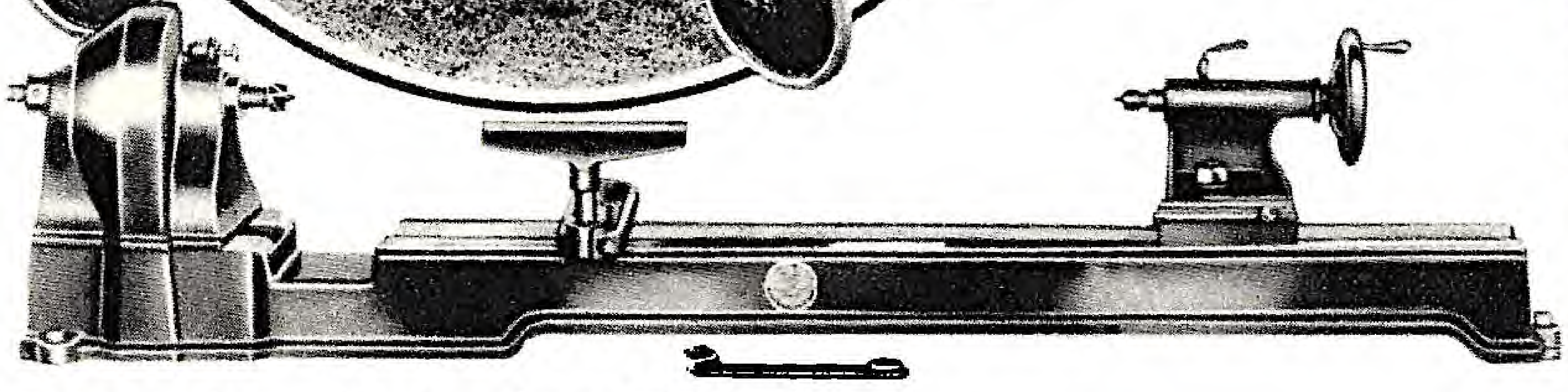
SUGGESTIONS

REMINGTON 5
NGTON RAND

A typewriter is the ideal gift for any member of the family. Here is one embodying all of the features found on a large machine yet small enough to carry about in a traveling case.



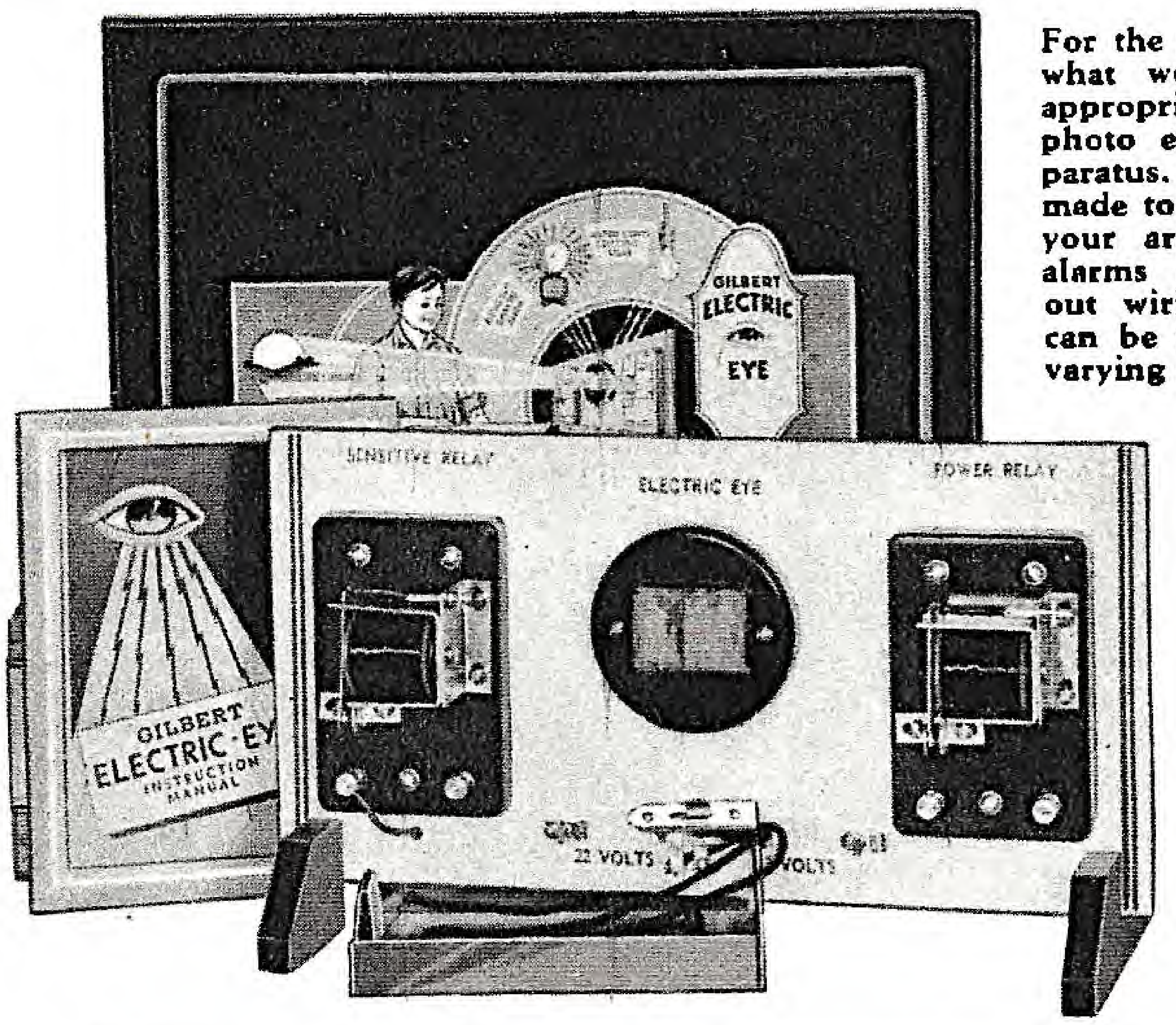
Junior will have the time of his life with one of these iron horses. Pushing on the foot levers causes the coaster to gallop just like a real horse.



For the workshop fan this practical wood turning lathe is just the thing. While inexpensive it does exceptionally fine work. Operates on light motor.

MERRY CHRISTMAS

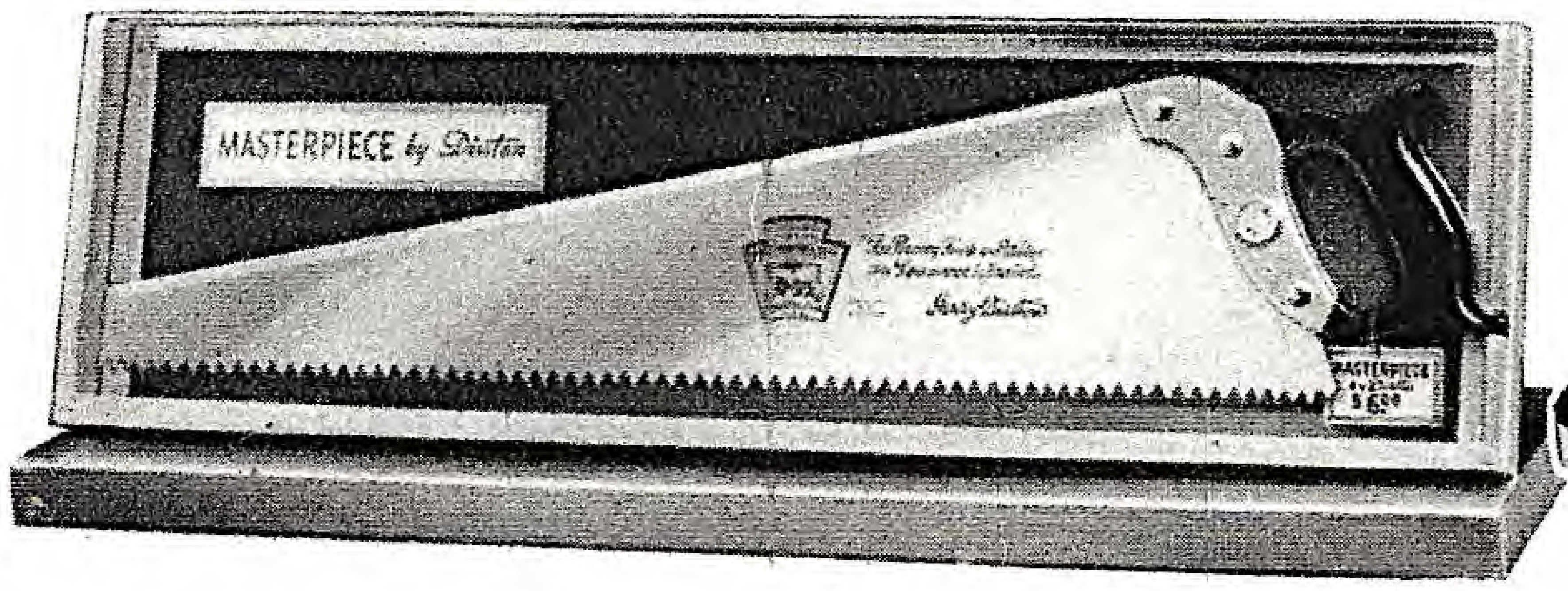
MORE CHRISTMAS


GILBERT ELECTRIC EYE
SENSITIVE RELAY
ELECTRIC EYE
POWER RELAY
GILBERT ELECTRIC-EYE INSTRUCTION MANUAL
22 VOLTS

For the junior scientist what would be more appropriate than this photo electric eye apparatus. Motors can be made to run by waving your arm, burglar alarms installed without wiring and music can be produced from varying light beams.

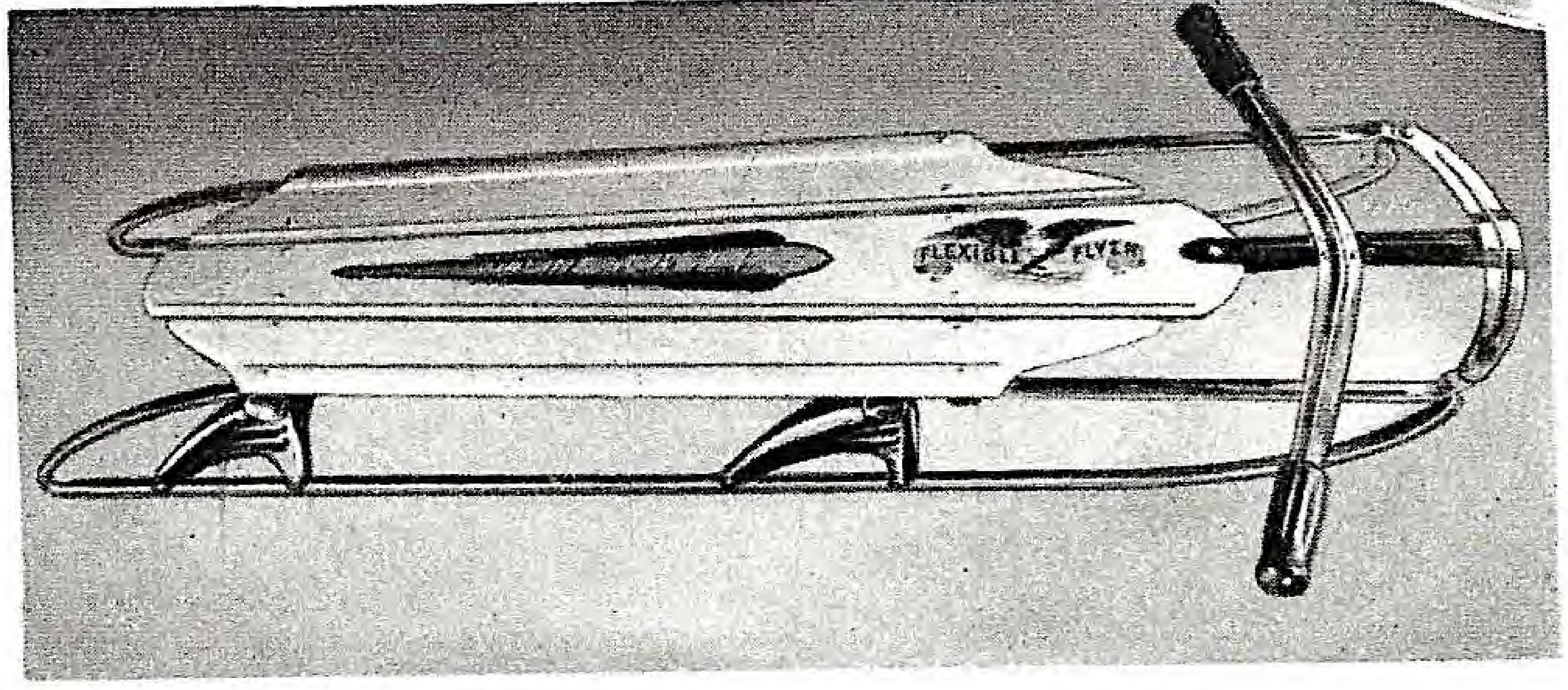
EVEREADY
SPOTLIGHT

Any member of the family will appreciate a flashlight. This model features a chrome case and a positive contact thumb switch.

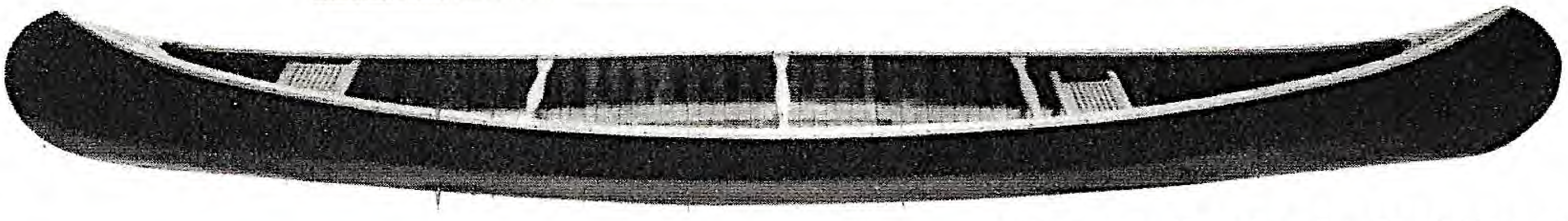

MASTERPIECE by Disston

ROYAL
TOUCH CONTROL

For the handy man a good saw is a worthy gift and one which he will appreciate. A streamlined sled that steers will meet the fancy of youths of all ages. An easily operated steering bar controls sled's direction.


FLEXIBLE FLYER

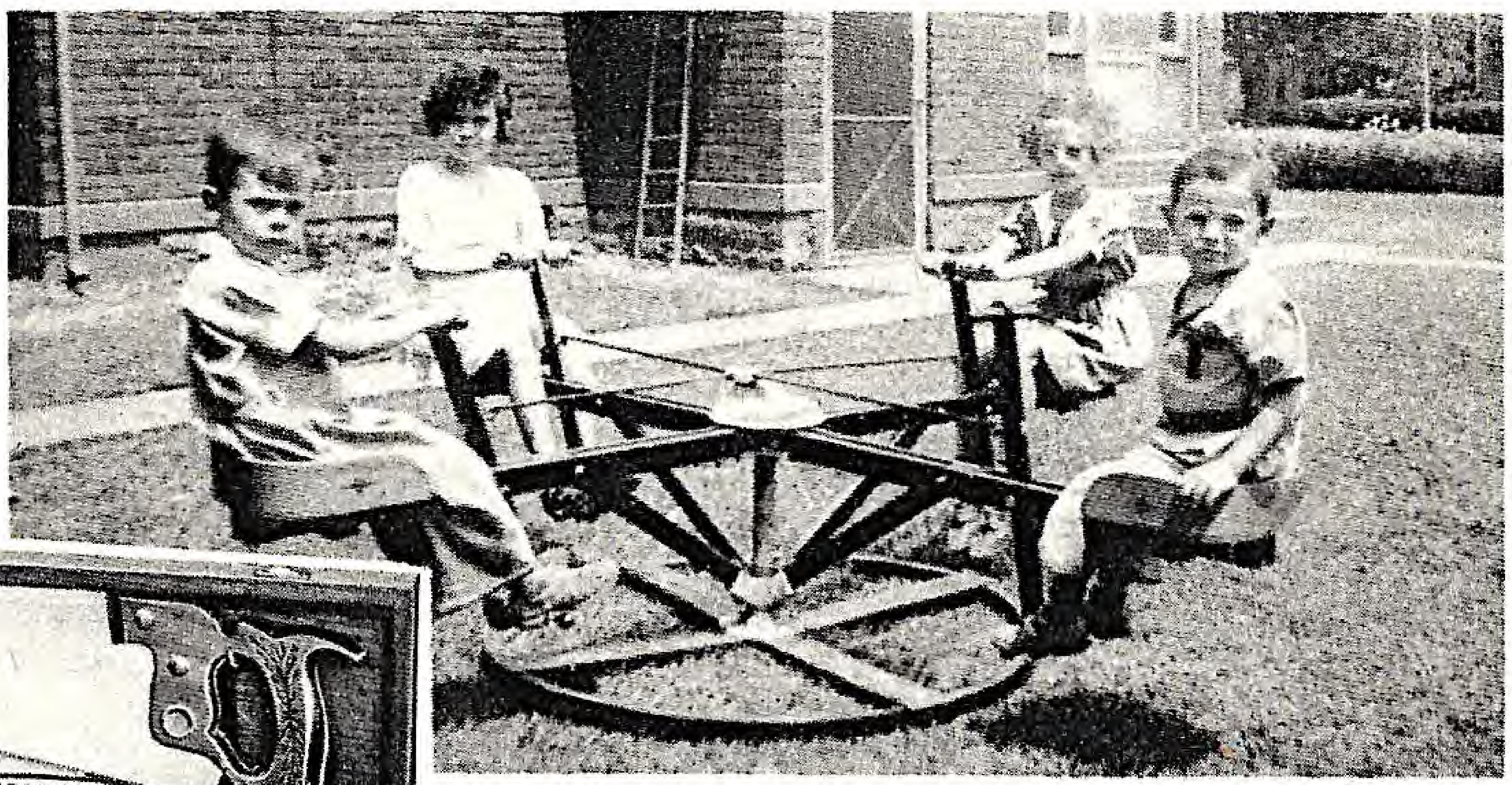
Another typewriter that will make an excellent gift for someone. This neat machine is the next thing to a full size type. A canoe such as the one shown below will add many pleasant hours to next summer's trip.

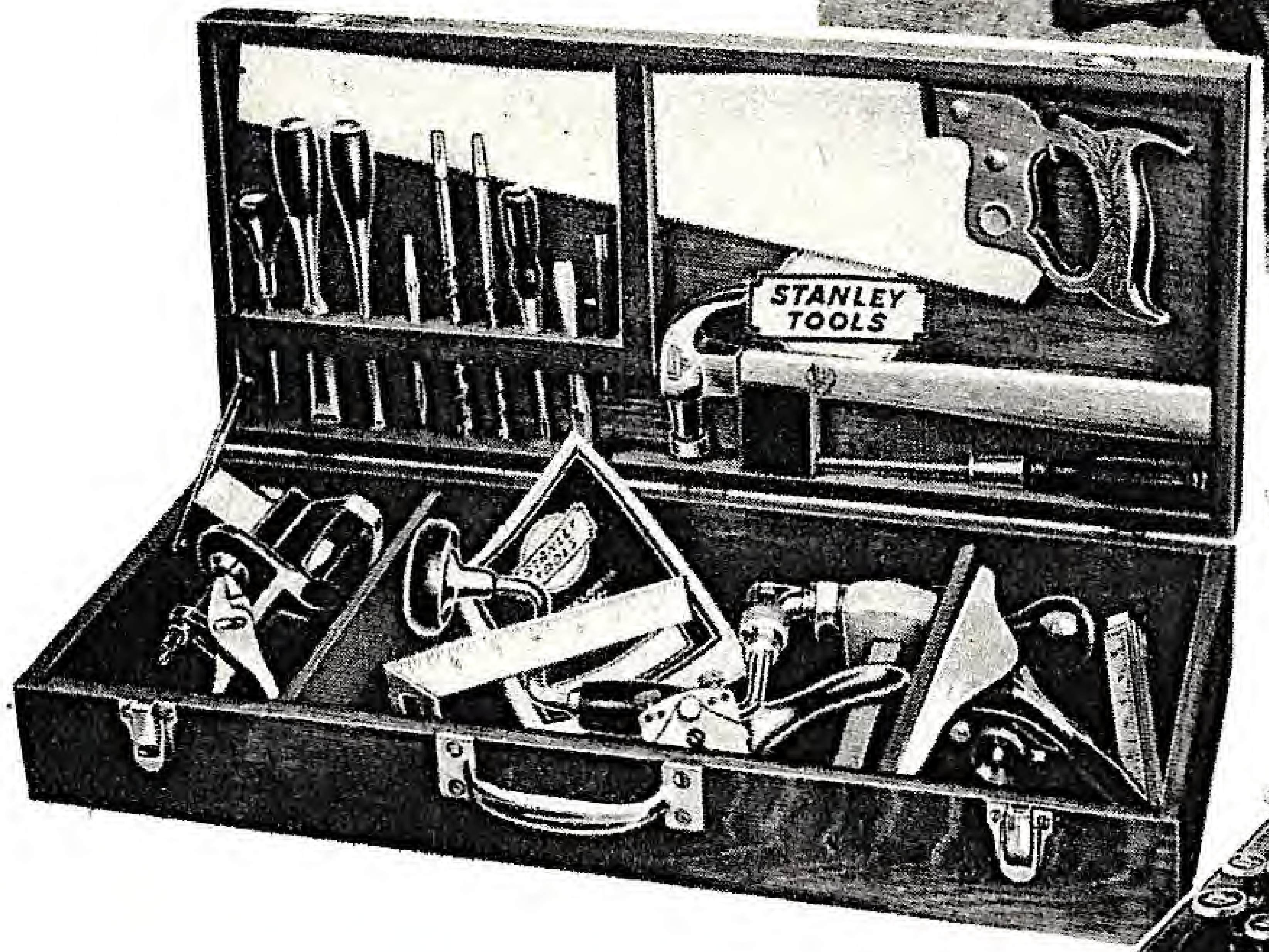


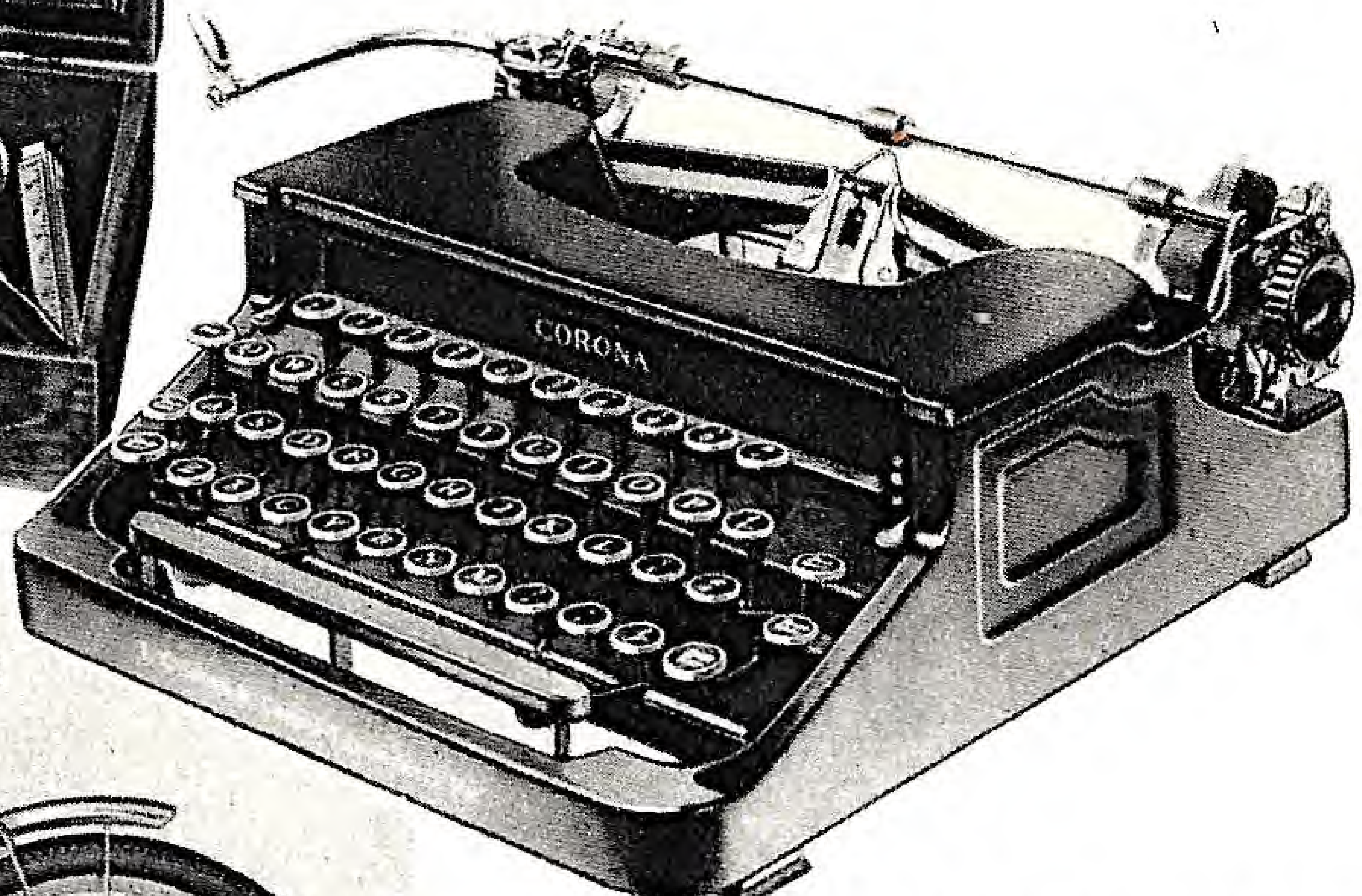
SUGGESTIONS

MERRY CHRISTMAS

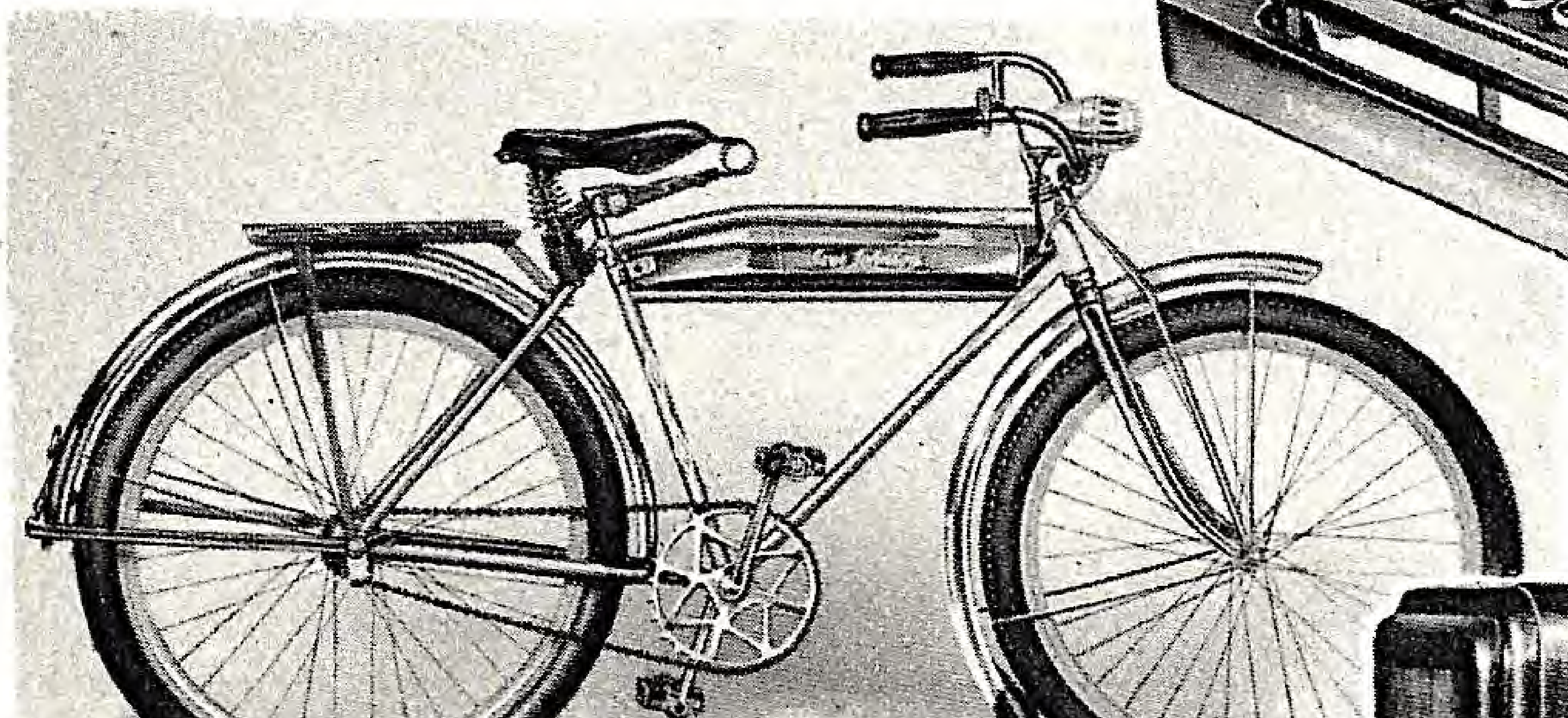
Around and around it goes. This toy merry-go-round operates like the familiar railroad hand car and can be set up either indoors or out. It accommodates four children. Below—What shop enthusiast wouldn't appreciate this complete workshop, tool chest. Chest includes every hand type of woodworking tool used in the shop.

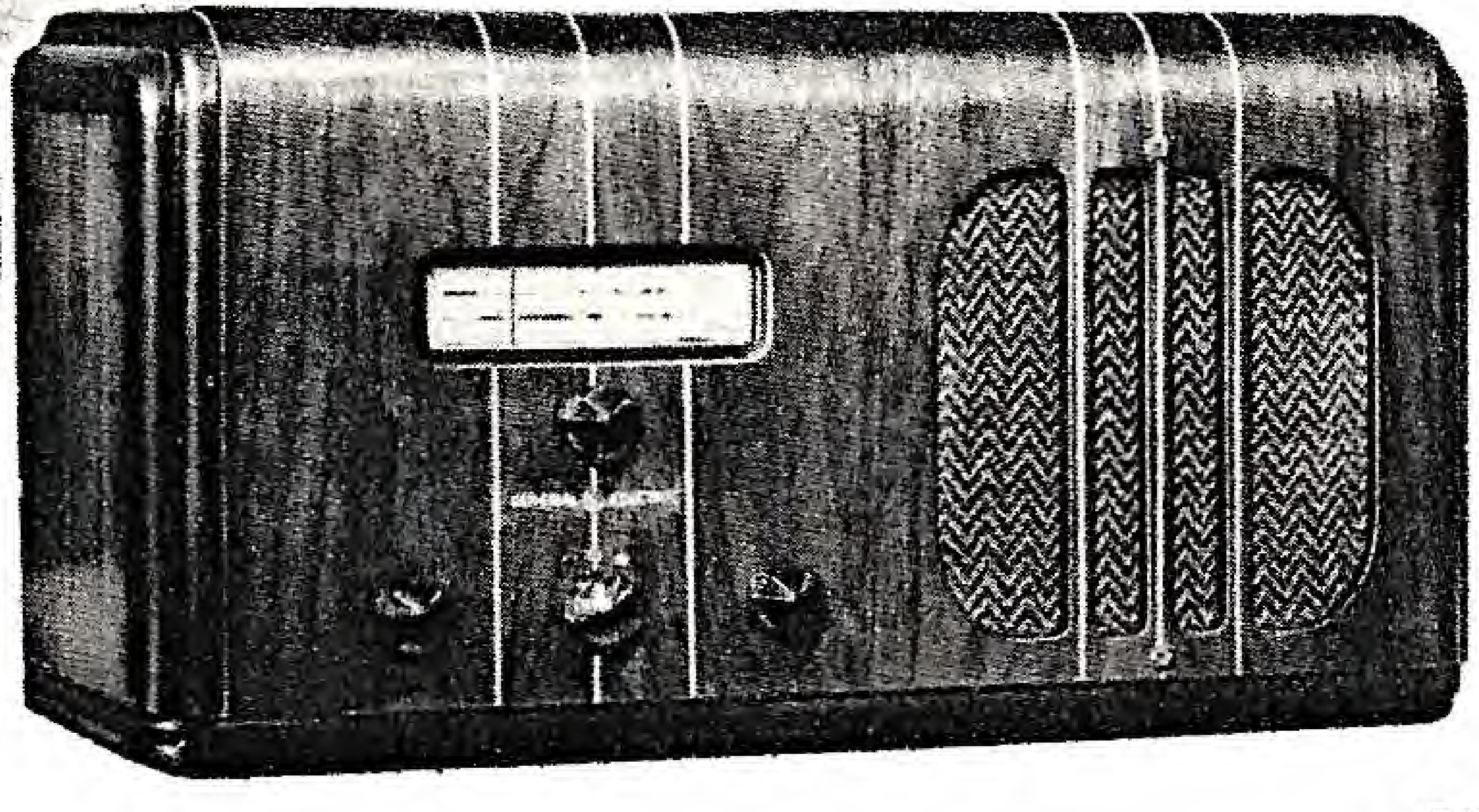






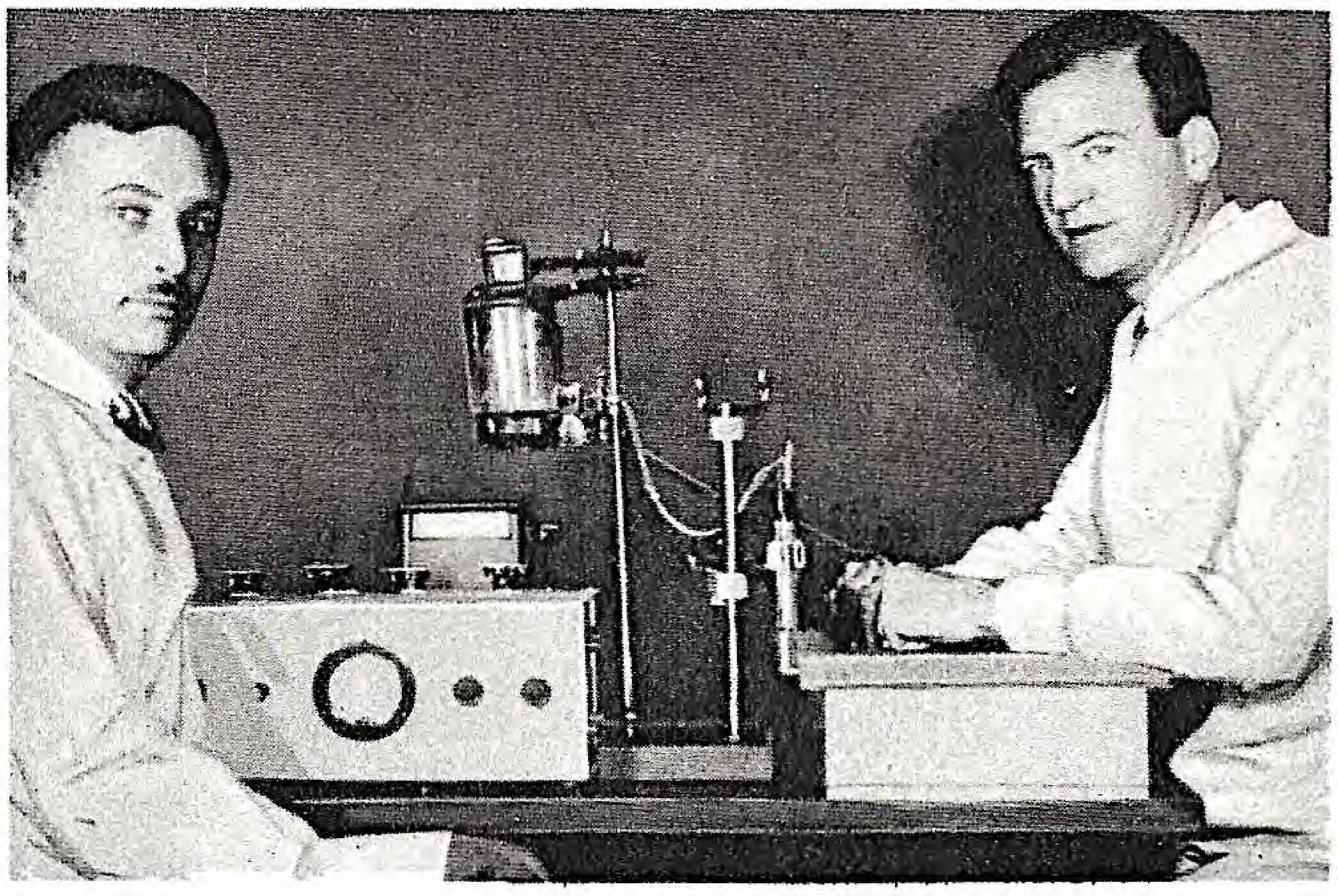
Popular for home use this new portable features a paper support rack. Extra long carriage return bar makes it easy to operate.





Balloon tires, combined horn and light and tool box case are a few of this bicycle's features. Right—An all-wave radio set is something that the whole family will enjoy for years to come.

Yale Scientists Trace Cancer To Body Electricity



Prof. H. S. Burr of the Yale School of Medicine, left, is about to test the electricity in the body of his assistant, Dr. R. G. Meader, with the apparatus shown here. A ultra-sensitive vacuum tube microvoltmeter is used in test.

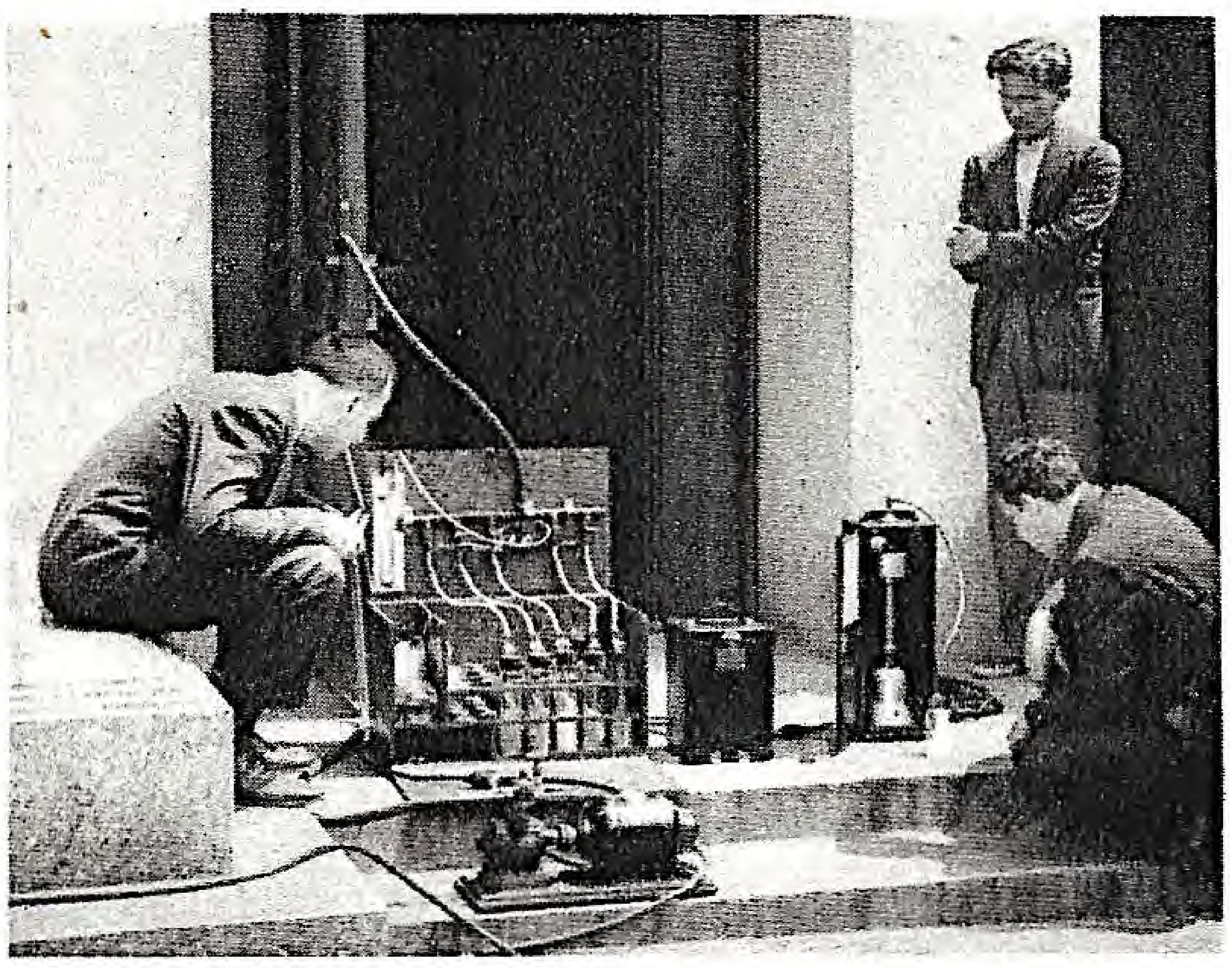
ELECTRICAL changes in the human body may explain the cause of cancer according to Prof. H. S. Burr, of the Yale School of Medicine. Working with Dr. R. G. Meader, Prof. Burr has found that minute changes in the living process are accompanied by changes in body electricity. Using a highly sensitive vacuum tube microvoltmeter the electrical current in the bodies of both humans and animals can be measured without the use of an external current supply.

With constant checks on the current output of the body organs the scientists believe that they can not only solve the cause of cancer, but find the clue to the way in which heredity cells function resulting in inborn diseases. Animals which have been injected with disease germs substantiate their claims.

WPA Tests Air In Public Places

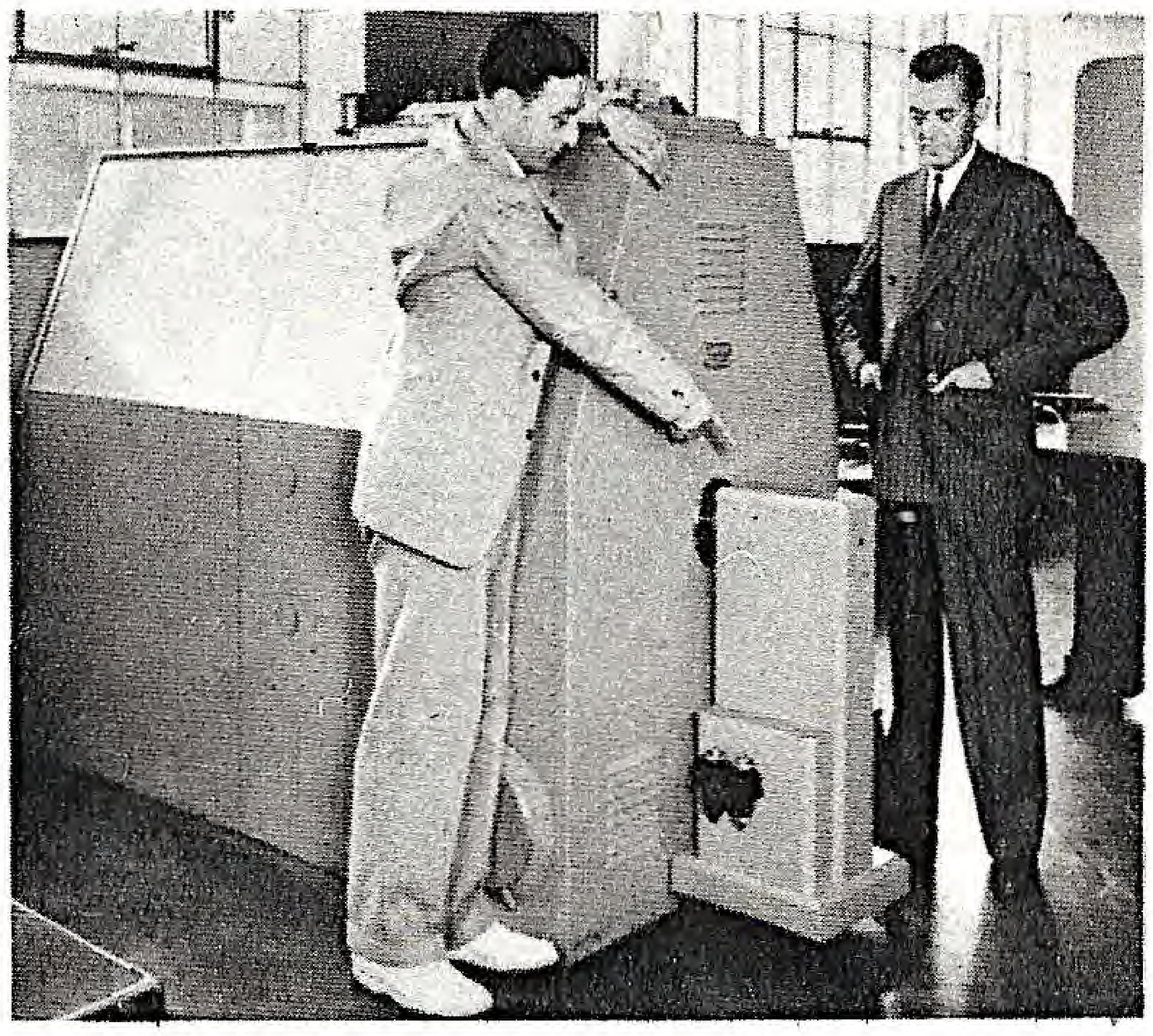
WITH the belief that many of New York's public buildings contained an excessive amount of foul air, Works Progress officials directed an investigation into the matter. Special chemical apparatus was constructed and technicians sent out to check the effectiveness of air conditioning and forced air cooling in large buildings.

At the same time others collected samples of dust in the air and gas laden street fumes. Samples of air and dust gathered in all parts of the city were then tested by young men and women working under the direction of Arthur C. Stern, of Stevens Institute of Technology. Assisting Mr. Stern is Dr. Buchbinder, of Columbia's Physics staff.



Employed by the Works Progress Administration for the City of New York, these technicians are making tests of air in public buildings. Specially designed chemical apparatus is used.

Furnace Combines Air Conditioner



Designed especially for use in small homes this enclosed oil burning furnace combines an air conditioning unit. It was developed in the laboratory of Gar Wood, speedboat racer.

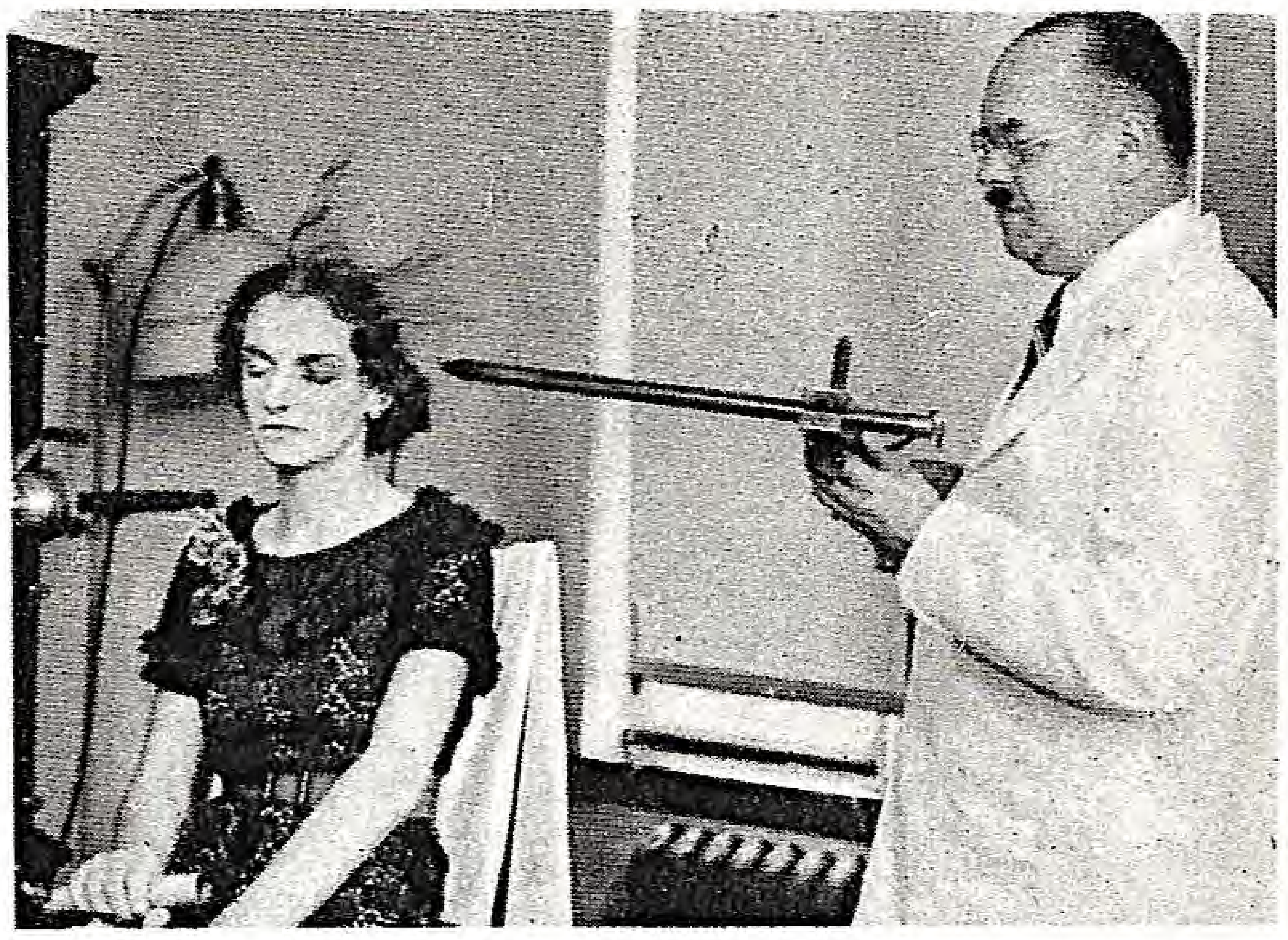
A COMPACT oil burning heater which combines an air conditioning unit suitable for use in small homes has been recently perfected in the laboratory of Gar Wood, noted boat racer. The new unit provides humidifying, air filtering and forced warm air circulation in addition to automatic heating in the winter and blower cooling and air filtering in the summer.

Electric "Bombardment" Treatment Cures Black Eye

A DISFIGURING, and sometimes embarrassing black eye can be removed in less than one hour by the use of a new static machine that "bombards" the eye with electricity. The electric treatment is painless.

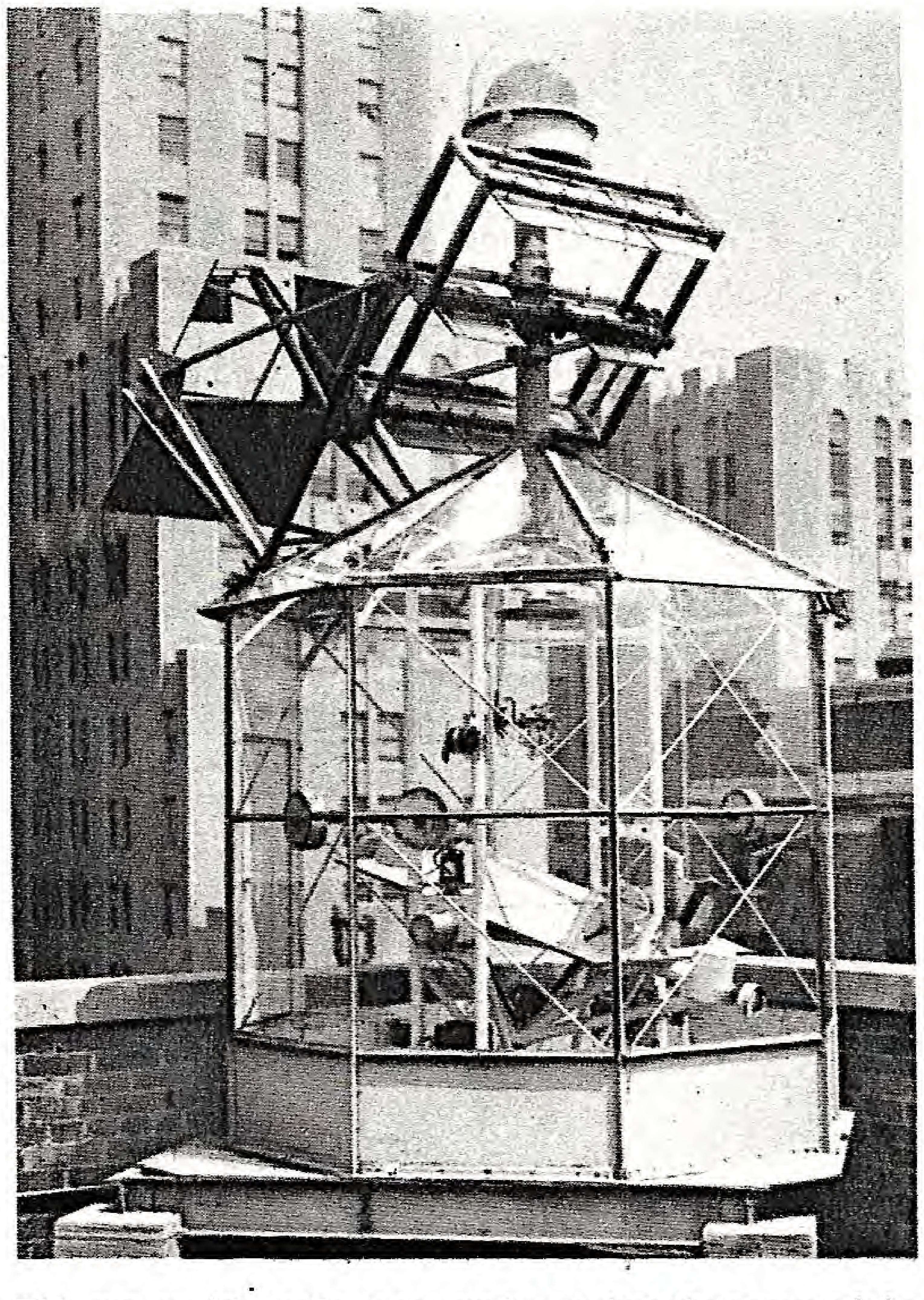
The static device, as explained by Dr. Norman Titus, New York City physiotherapist, consists of a simple negative and positive electrode. The patient holds the negative electrode while the attending physician "aims" the positive electrode at the discolored optic.

The electric "bombardment" by the static machine breaks up the coagulated blood. This allows the capillary system to resume a free flow and carry away the discoloration.



Dr. Norman Titus, prominent N. Y. City physio-therapist, is "bombarding" this young lady's black eye with a static machine. It breaks up coagulation, removing discoloration.

Sun Machine Lightens Hotel Rooms



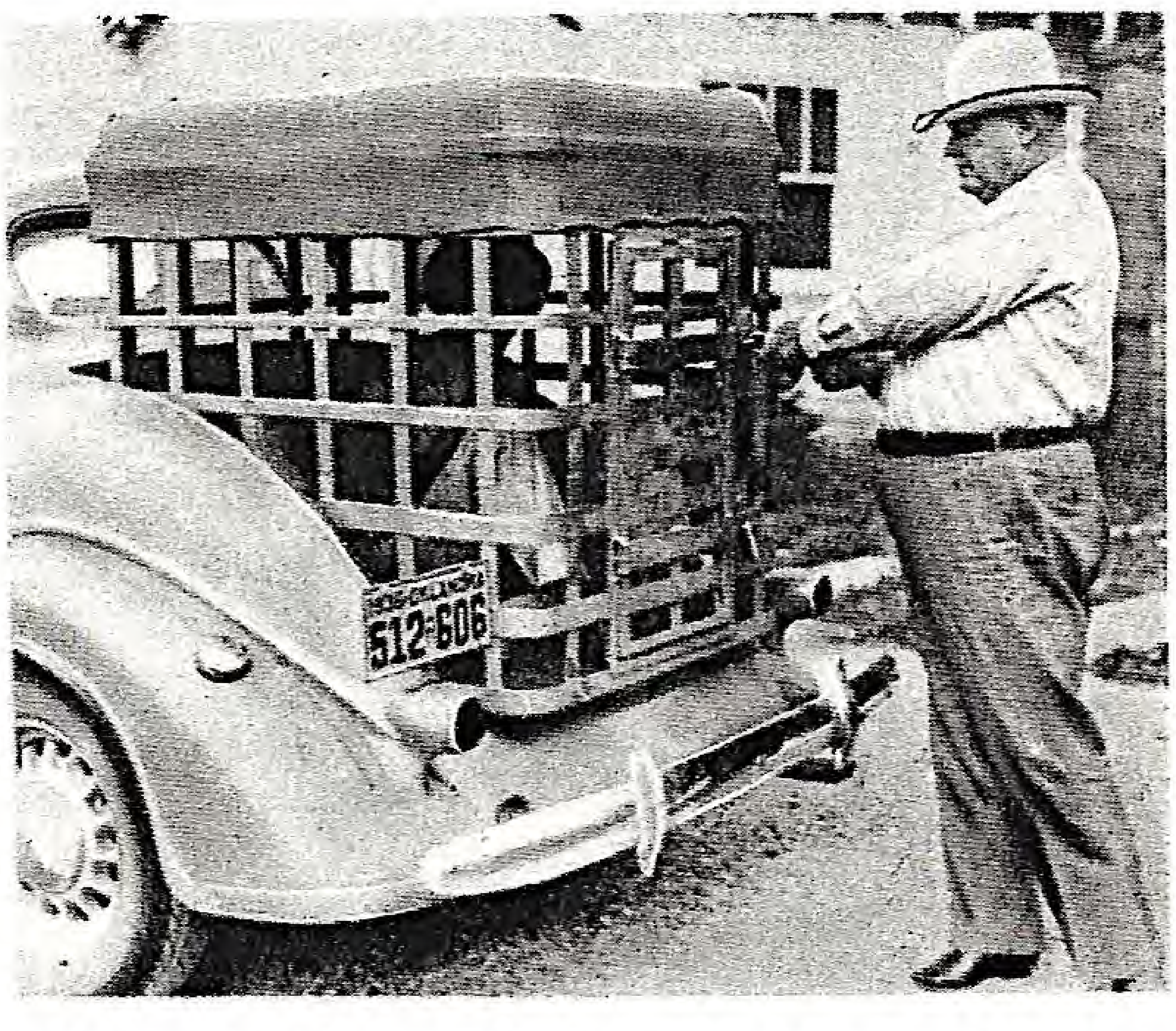
This sun machine reflects the sun's rays into the rooms of the Park Lane Hotel in N. Y. City, making them lighter. Master mirror on top reflects sun to "relay" mirrors at room windows.

A NOVEL sun machine for providing brighter day lighting in rooms of apartments and hotels is being tested at the Park Lane Hotel in New York City. A master mirror at the top of the machine follows the sun and reflects sunshine to room windows. Jacques Arthuys is the inventor.

Portable Auto Jail Houses Fugitive

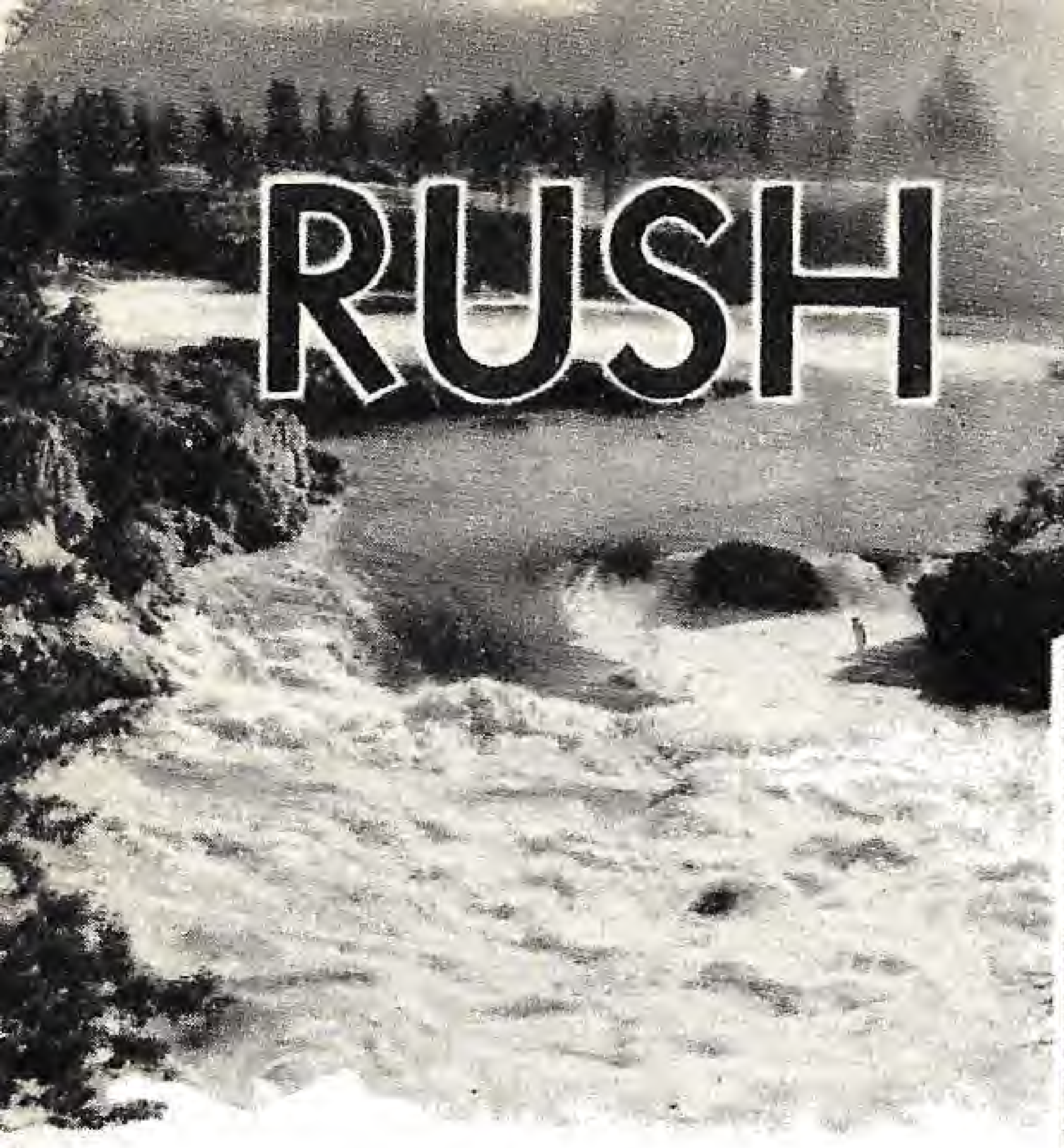
A NEW style in portable "hoosegows" was set by an Oklahoma police official when he built a steel cage on the back of his passenger auto. The "jail" was used to bring back a fugitive who had escaped from the McAlester, Okla., prison. He had been recaptured by Pittsburgh, Pa., police.

Alex Watson, transfer agent of the prison, drove 1,000 miles to bring back the prisoner. The "jail" was made by ripping off the lid of the luggage compartment of a regular coupe automobile and screwing down an all-welded steel cage. An awning protected the prisoner from the sun, and a cushion provided the interior "comforts" of the jail. The prisoner was released from the cage for brief exercise periods throughout the trip.

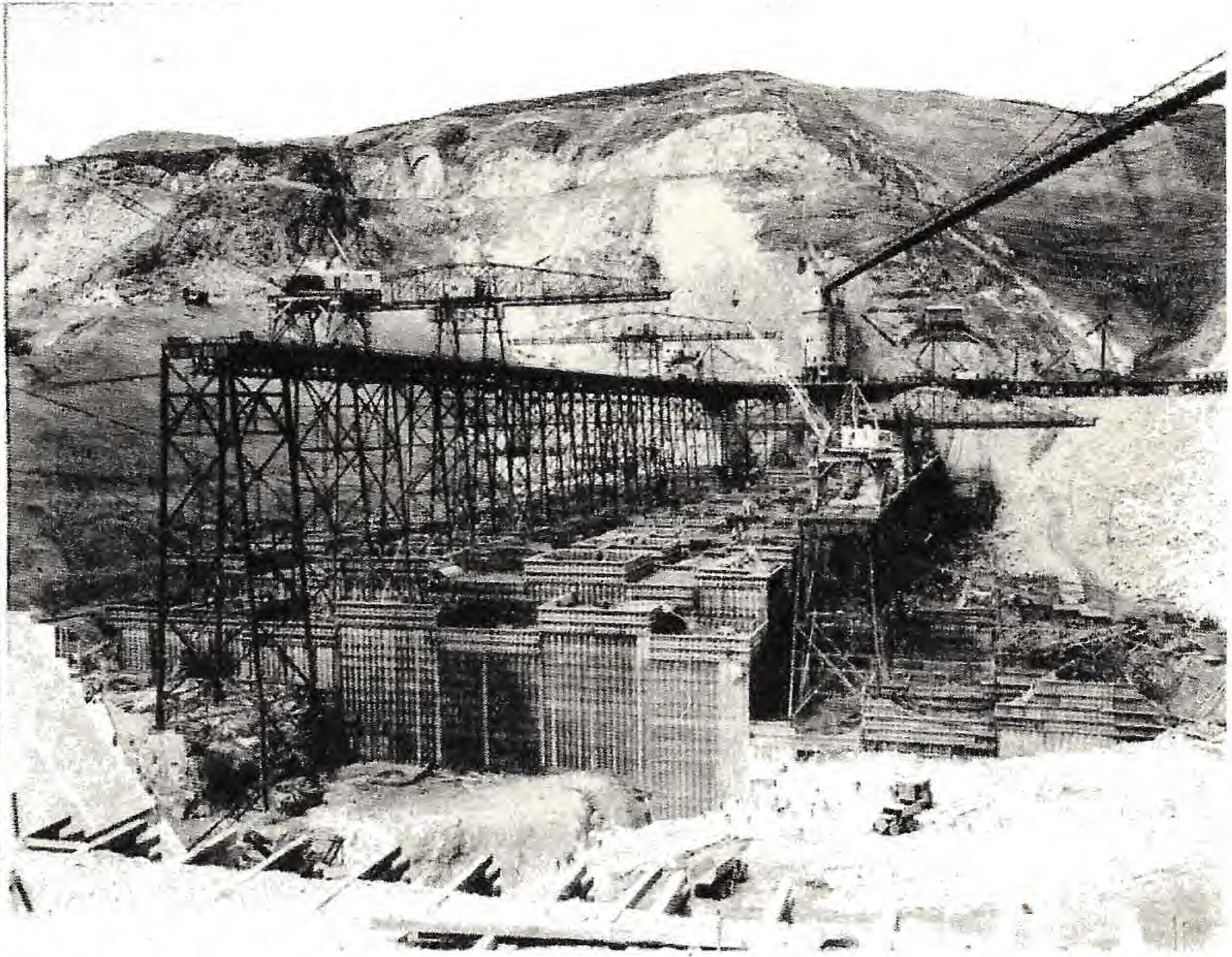


This home-built, portable "hoosegow" was used by Alex Watson, of the McAlester, Okla., prison, to bring back an escaped fugitive who was recaptured over 1,000 miles away.

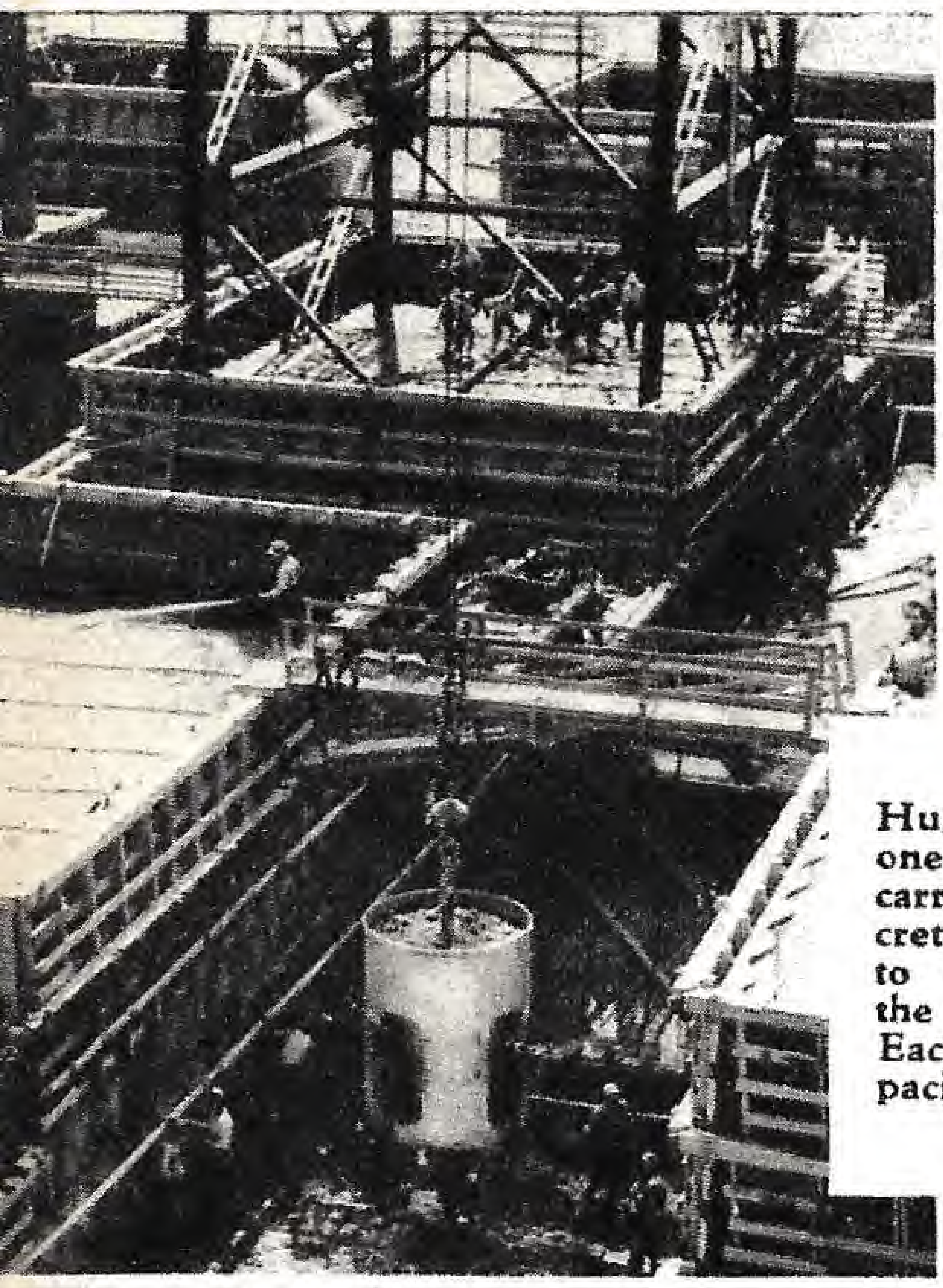
RUSH DAMS TO END



This is the Columbia River, the West's finest producer of water, which will shortly be harnessed.



Already more than half a million cubic yards of concrete have been poured at Grand Coulee Dam and construction continues at rate of 6,000 cubic yards a day as engineers rush project.



Huge buckets, like the one in the foreground, carry the tons of concrete from the mixers to the steel forms in the canyons far below. Each bucket has a capacity of 4 cubic yards.

ENGINEERS and laborers working under the direction of the United States Bureau of Reclamation are rushing toward completion four great dams that will provide irrigation for more than 2,000,000 acres of land that is now arid.

The Seminoe Dam on the turbulent North Platte River when completed will cost $8,500,000 and provide both power generation and irrigation. The Alcova Dam on the same river will be earth filled and cost about $3,500,000. A $7,000,000 canal system will carry the waters of the two dams to irrigable lands within a radius of 106 miles.

The Grand Coulee Dam in the State of Washington far exceeds the others in cost.

W. E. CALLAHAN
CONSTRUCTION CO.

Here engineers are starting work on the 260-foot Seminoe dam by blasting the abutments. Right—Mighty excavators like this move 16 tons of soil each scoop.

DROUGHT MENACE

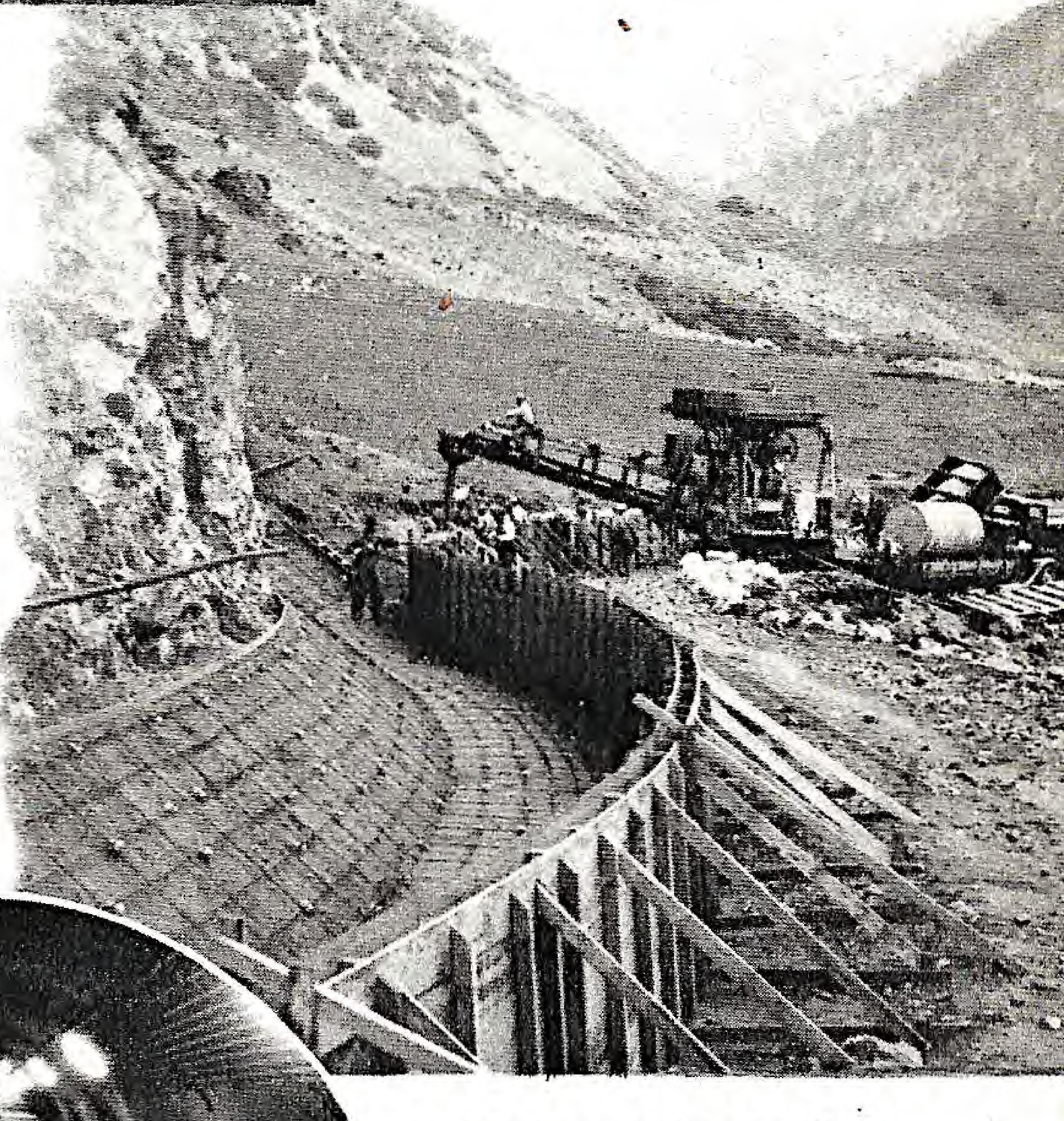
Rapidly nearing completion, Boulder Dam, shown above, will not only provide arid Western States with water, but furnish abundant electricity, too. Pressing a gold telegraph key President Roosevelt recently set the first of the dam's mighty turbines roaring into operation.

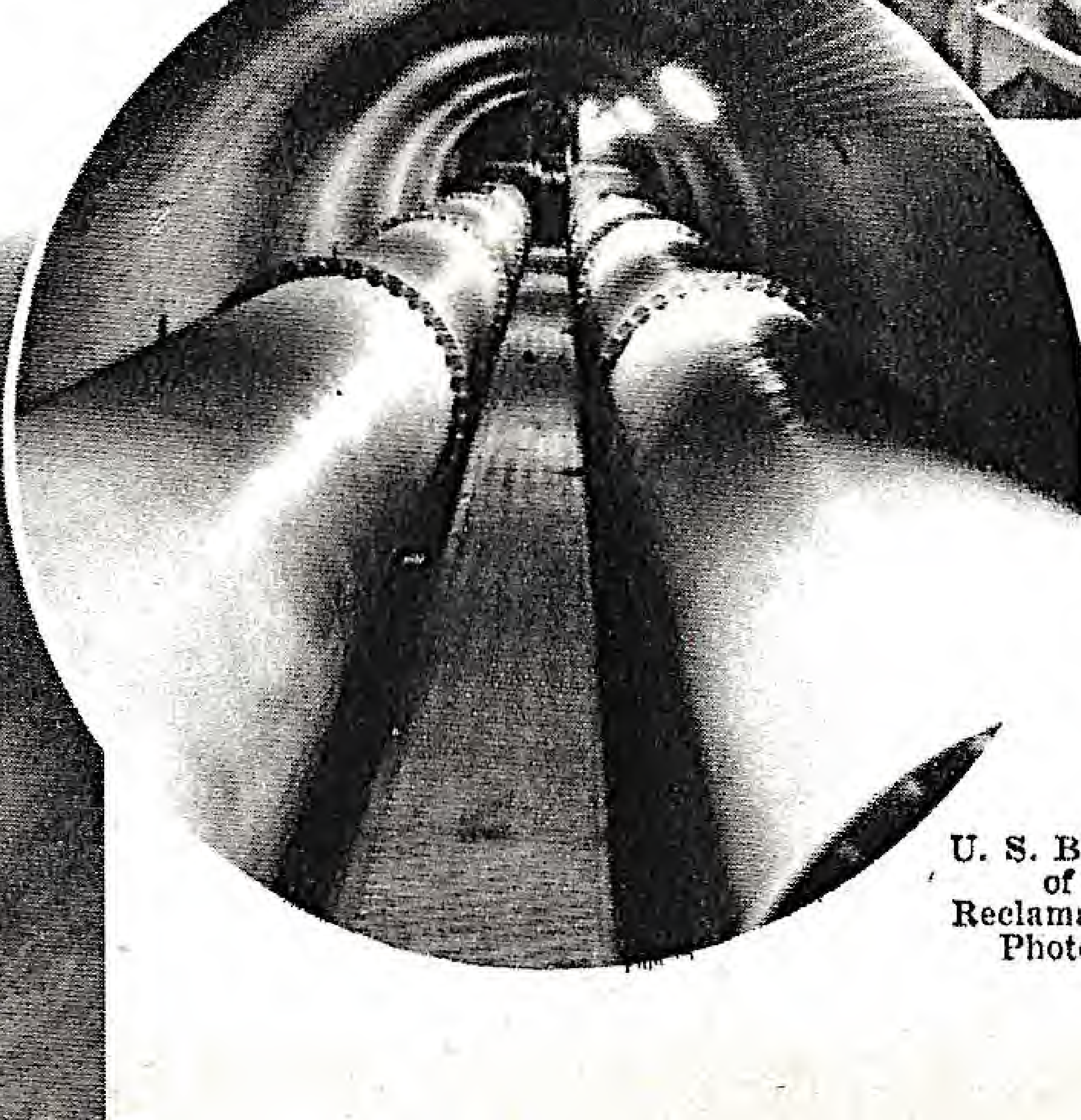
This is the Rye Patch Dam in Nevada which only recently was completed. Of earth fill construction, 75 feet in height, the dam will store up the wasted waters of the Humboldt River.

Here dual dams are tentatively scheduled to be constructed although the $60,000,000 appropriated by Congress is for the lower dam, only. The mighty Coulee dam will open 1,200,000 acres for cultivation.

Still another dam, the Bonneville, is being erected in the great canyon of the Columbia River in Oregon where the stream pours through the Cascade Mountains. Costing $40,000,000 this dam will be in operation next year.

Handling a mighty jackhammer, this worker drills into bedrock on Grand Coulee project.





Working under the direction of government engineers these workers are installing concrete troughs which will carry the waters of the Ogden River in Utah. The wire mesh in the bottom of the trough is for reinforcing the concrete. Left—Through these pipes flows the water of the Humboldt River in the newly completed Rye Patch Dam of Nevada. Under control, the river's value is increased immeasurably.

U. S. Bureau
of
Reclamation
Photos

Water Pressure Operates New Type Automatic Ship's Log

Above—A glance at this new instrument at the navigating officer's side answers the important nautical questions: "How far have we come?" and "How fast are we going?" Left—The mechanism of the new Swedish device.

A NEW automatic ship's log developed by a Swedish manufacturer does away with the need for propellers or other rotating parts usually found in such devices. It depends chiefly on water pressure to operate.

The new device consists of a tube, fastened to the ship's keel, which extends into the water for about two feet. Water enters the tube as the ship moves, and its speed governs the pressure that the water will exert upon a sensitive diaphragm located in the tube. The diaphragm operates a speed mechanism of a master log, mounted in the engine room.

The speed mechanism operates a clockwork-controlled motor drive, through which the distance is automatically computed and recorded on the principle that speed × time = distance. Readings of speed and distance shown on the dials may be transmitted electrically to as many parts of the ship as desired. The device is so accurate that it records speeds of a fraction of a knot.

"Bulldozers" Clear World's Fair Site

BULLDOZERS, a special type of tractor, are being used to level the site of the World's Fair to be held at Flushing, N. Y., in 1939. More than 1,000 acres of meadow land have to be filled in to make the fair site, and the powerful Bulldozers batter, push, spread, and level the earth dumped there. Gar Wood Industries built the tractors.

"Bulldozers," a new type of tractor, are being used to level the site of the World's Fair to be held at Flushing, N. Y., in 1939. They can push, batter, spread and level the earth.

Hotel Installs Room Cooling Units

This young lady is controlling the air conditioning unit installed in her room at the Hotel Statler, St. Louis, Mo. Each room is fitted with a thermometer and control gauge, so guests can regulate room temperature to suit their personal comfort.

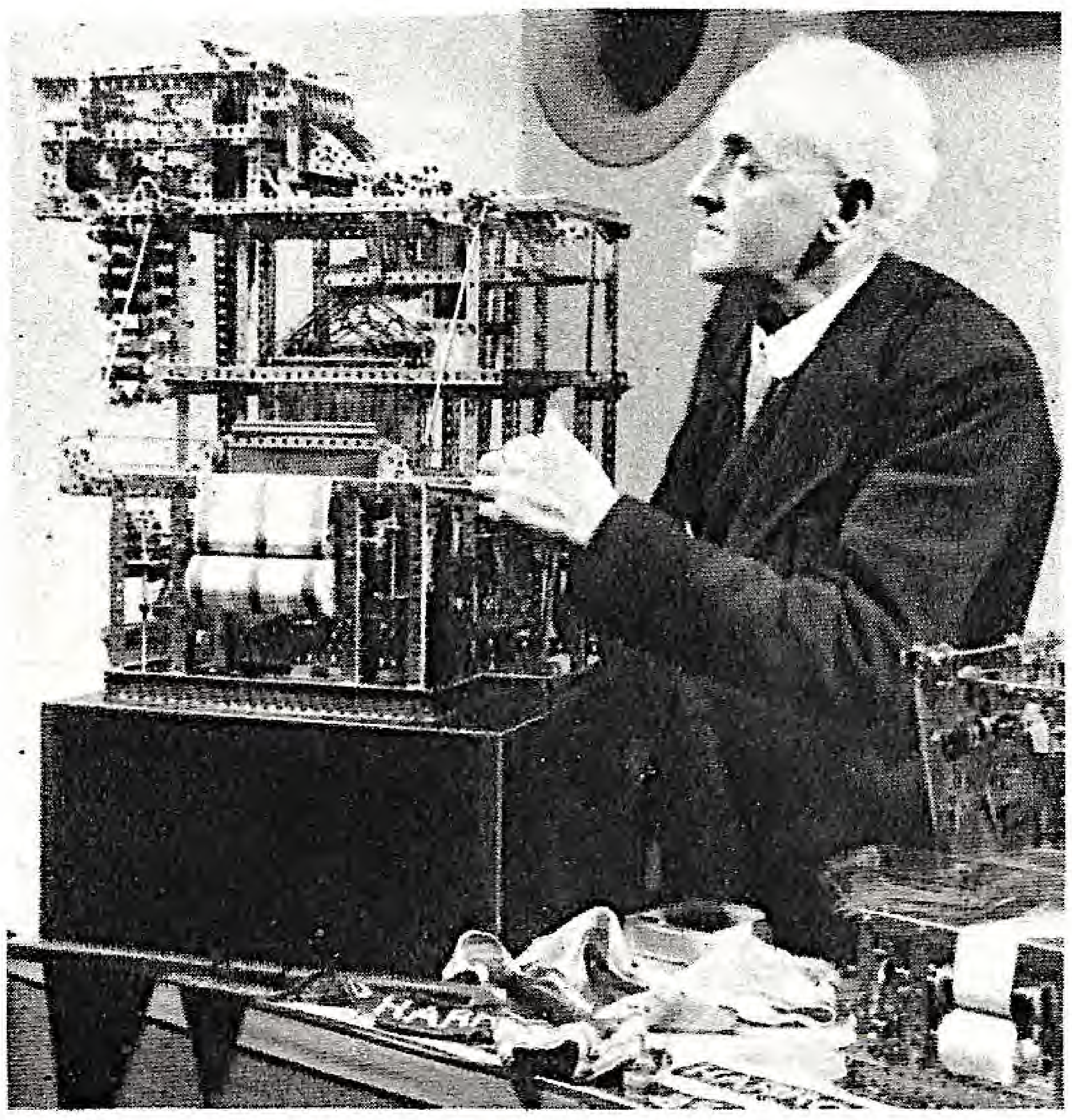
THE largest hotel air conditioning unit in the U. S., has been installed in the Hotel Statler, St. Louis, Mo. Each room contains its own unit regulator and guests control the extent of cooling and air circulation within their rooms according to personal desire. The units, placed in room cabinets, consist of a coil through which cold water flows, and a fan that circulates the air over the coils.

Mechanical Wonder Man Is Operated By Radio Control

"ROBIE," a mechanical robot walks, talks, smokes and winks his eyes when electrical impulses are transmitted to his "radio" brain. The unusual animated character is the work of Arthur Wilson, of Chicago, Illinois. More than a year's work and the assistance of three men were required to perfect the robot which is constructed of sheet metal and wood.

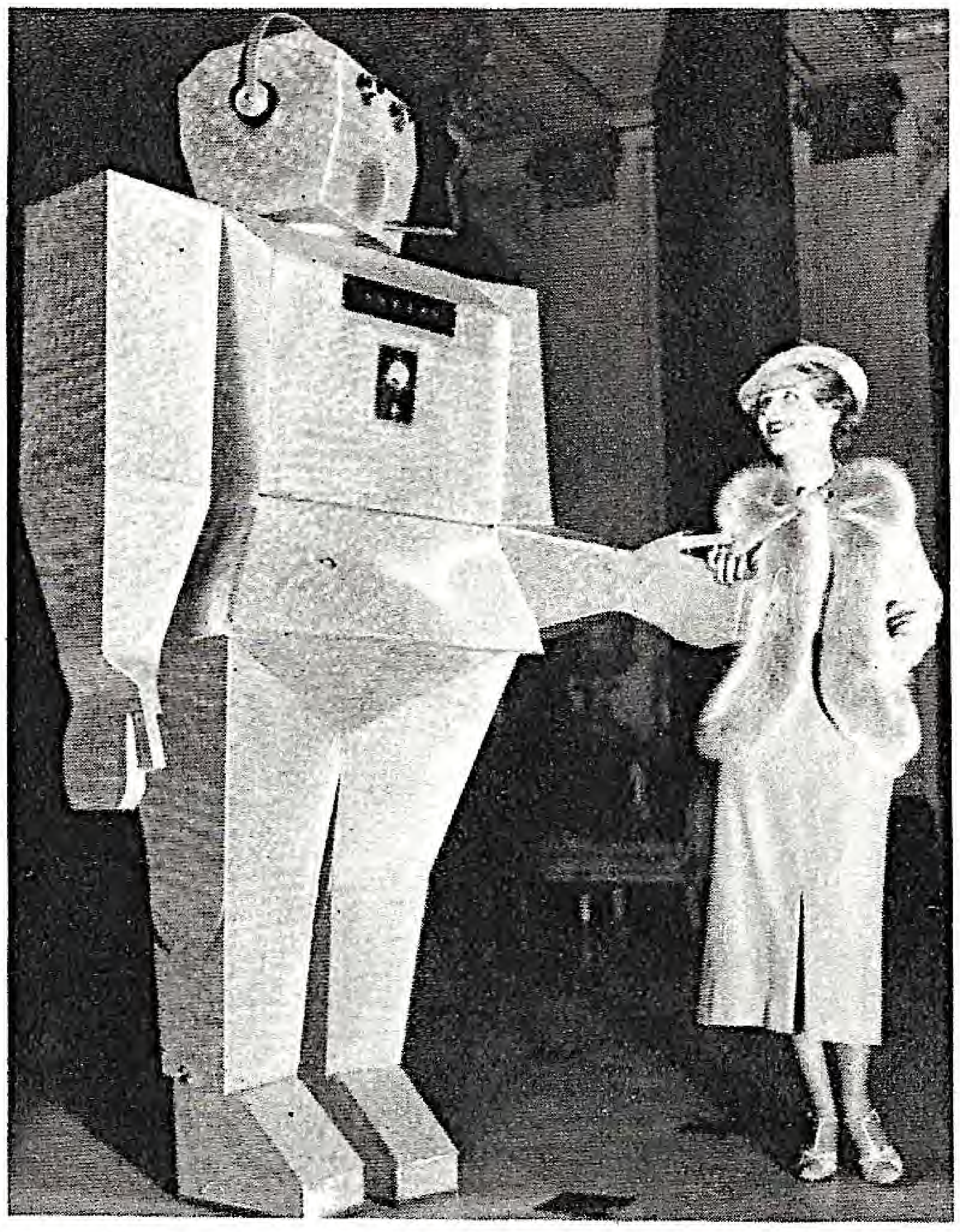
The interior of the mechanical wonder man is a maze of electrical apparatus which is used in providing speech and motion. A special receiver picks up the shortwave impulses sent out by his remote controlled mind, station W9X10, to provide animation.

Builds Tiny Looms That Work



Constructed chiefly from toy constructor parts is this working model loom which weaves 554 threads into an intricate word design. G. Yoxall, its inventor, is shown making adjustments.

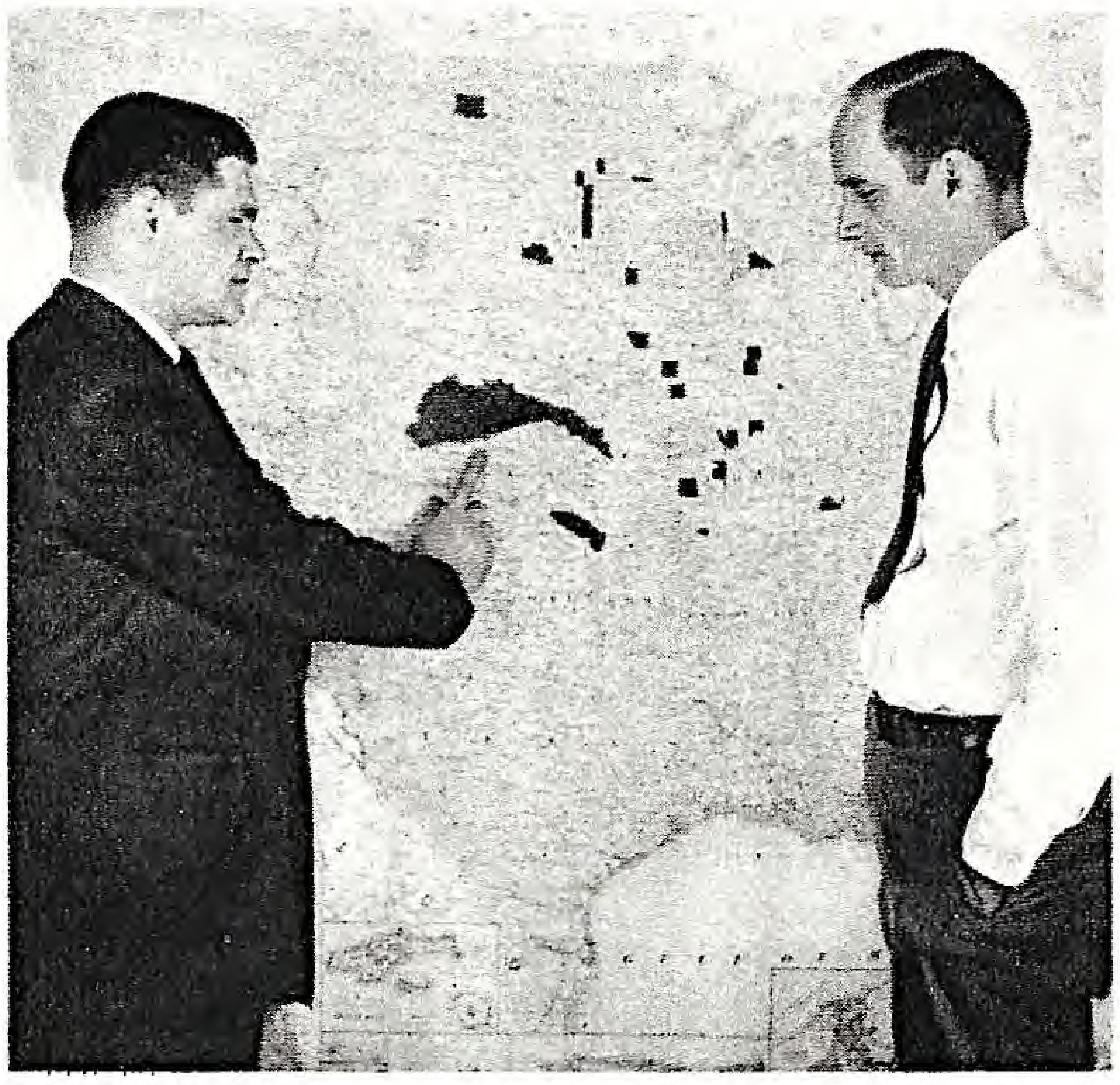
BUILDING miniature looms that actually weave cloth into intricate patterns is the spare time hobby of George Yoxall a London weaver. The looms are assembled from toy constructor parts and small gears which must be specially made for the tiny mechanism. One of the looms accommodates 554 threads and weaves them into a design equal in quality to the work produced on full size equipment. Mr. Yoxall's first loom gained such wide-spread attention that he set to work on others. His large loom weaves a seven-letter name in a souvenir belt.



Here is "Robie," the amazing radio controlled mechanical man that can do practically everything but think. He is the brain child of Arthur Wilson of Chicago, Illinois.

Air Cameras To Plot Dry Areas

SKILLED aerial photographers working under the direction of the Federal government are rapidly mapping 38,080 square miles of mid-western states which are to be relieved of drought menace. In this, the most extensive aerial mapping project ever undertaken, four planes will be used for survey.



Robert Shippee, who will direct the aerial mapping of the nine drought stricken states, points out the area to be charted in survey to be conducted by his firm for the U. S. Government.

Methods Of

by ROBERT PAGE LINCOLN

Frank Swada, of Big Rapids, Mich., is credited with being the first man to use a motorcycle in deer hunting. He is shown here with a 198-pound buck he shot. The motorcycle constitutes a fast and economical way to reach distant hunting areas.

In still hunting, one often has the opportunity to surprise a buck, as proved by this unusual photo. This is a White-tail, or Virginia deer, a type that is hunted by over 75% of hunters.

DEER hunting divides itself variously into three groups, namely, hunting in open country; hunting in mountainous country, and hunting in the wooded sections. Undoubtedly each of these three phases of hunting the Virginia or white-tailed deer, and the several other species in the north and on the Pacific Coast, must be treated differently. The conditions for hunting are often widely dissimilar. In the mountains and in the open it is necessary to speak often in terms of telescopes and long-range weapons of the high-power class, whereas, in wooded sections, the rifle used, while being a high power arm, does not necessarily have to kill at a mile to be effective.

A very great deal of the deer hunting done in the United States is for the familiar white-tail, and since it is found in woods of greater or lesser density, it is a form of hunting that is the most appealing, and in which most of our hunters engage. This deer is hunted either by what is known as the drive-method or by still-hunting in the north and the east, while in the South it is hunted with hounds, a method that is strictly forbidden in the North, where it is unlawful. The reason for the use of hounds in the South lies in the fact that the cover in which the deer are found is generally so dense as to make hunting impossible. In the South, shotguns loaded with buckshot are used in deer hunting. Very rarely is the shotgun with like shot used in the North. There some form of rifle is always the weapon selected for the kill.

In drive-hunting the deer a group of hunters walk through a considerable woods working toward a certain vantage point or where trails, known to be used by the deer, come out. Commanding a view of these outlet trails, several of the more experienced hunters stand watch, ready to shoot when the animals issue forth, frightened out by the beaters. While this may seem to be an air-tight proposition and a kill is certain, still it is a fact that deer slip by the beaters and a drive turns out unsuccessful.

The method of still-hunting is favored by

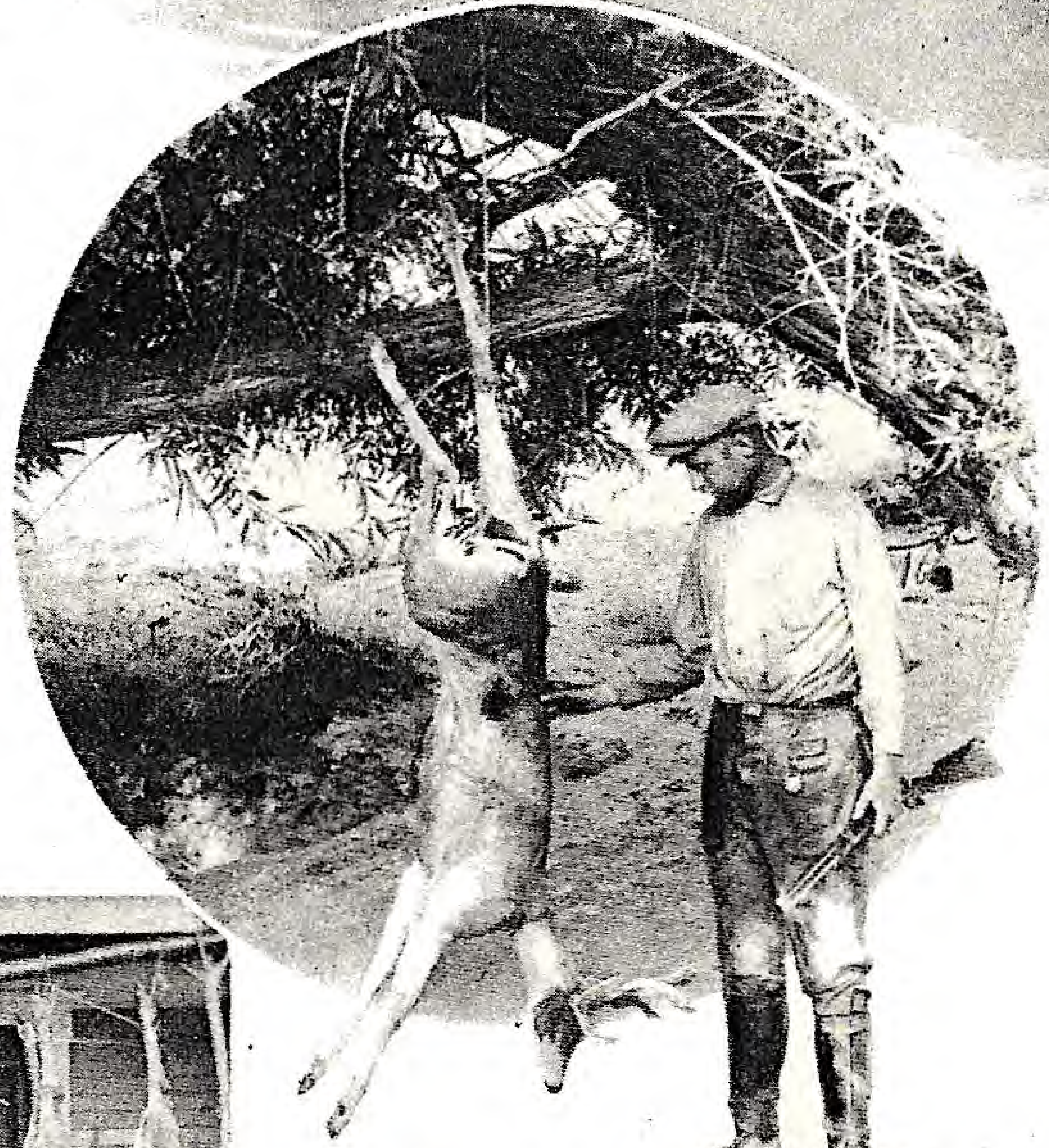
CAMPFIRE

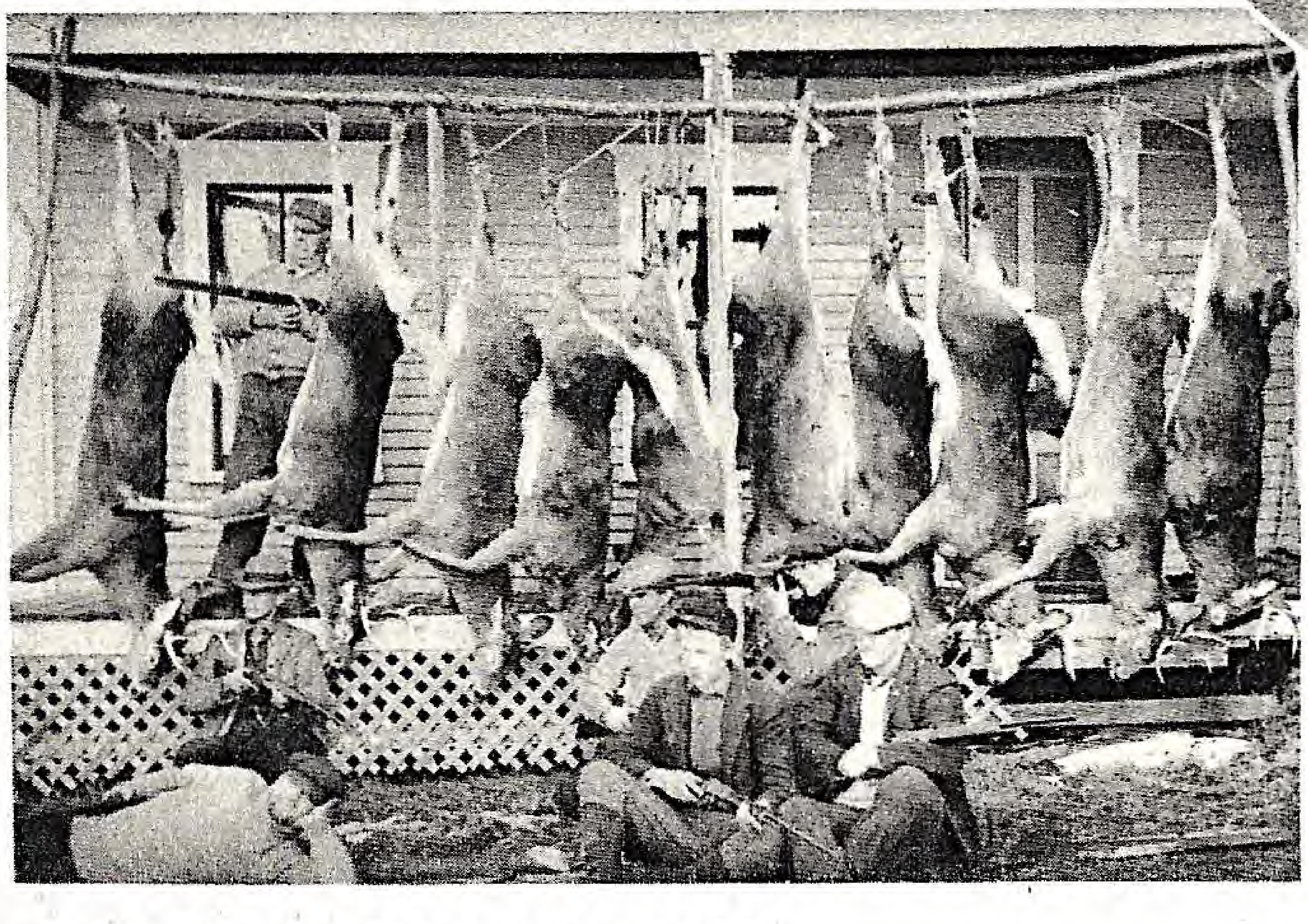
Deer Hunting

Bagging a swift footed deer is the crowning ambition of thousands of hunters. In this article, an experienced hunter and woodsman tells you how to bag yours.

fully seventy-five per cent of the hunting element and is the one that might be considered the most effective most of the time in most wooded regions. There is nothing difficult with regard to this form of hunting. It simply involves moving through the woods with due care and as soundlessly as possible, aiming to surprise a deer and to drop him before he has a chance to get away. Sometimes, snow permitting, one has a trail of a buck to follow which adds much to the interest of the hunt, in that one knows he has a specimen in front of him somewhere and may come up on him at any time. Still hunting, or deer stalking, is the natural way of hunting. Some do not favor it because

[*Continued on page* 124]





Above—While some woodsmen kill deer at very close range by stalking, using a small .22 caliber rifle, amateur hunters should always use a high powered rifle. Small caliber rifles drill a hole about the thickness of a pencil in size, failing to drop the deer unless the shot is a heart or head shot. High powered rifles tear a large hole in the deer, as shown here, making his trail of blood easy to follow and flooring the deer within short distance. Left—A good day's haul by a hunting party in Indiana. Deer hunting has many devotees throughout the U. S.

SPORTSMEN'S

How To Use

Oscar Quam, the author (right), and a friend ready to test a blind. Locating a good blind and using the proper decoys are just as important as the duck calling ability of the hunter in insuring a full bag.

MOST duck hunters seem to think that the success of a good duck caller is due solely to his duck calling ability. This is erroneous, as the associated factor of decoys. blind, and art of locating are so essential that one is of little value without the other.

Decoys and decoy setting are main factors in duck hunting today. A hunter who ignores decoy shooting, and relies on pass shooting, will have to invent new guns as well as shells.

The southern duck hunters may not fall for my version of a decoy set, because their conditions are different. When the ducks reach them in December or later, the males of all species are in full plumage. But in northern zones our season starts in October. At this time of the year the male's coloring is the same as that of the female. The coloring of the plumage of the males does not become distinct until November first. To us in the northern zone it ought to be clearly seen that a decoy set carrying nine decoys painted in full plumage of the male and three with that of the female, would be a dead give away as a decoy set when no such plumage appeared in the real duck.

For years I have recognized this fact and would not use any decoy carrying the plumage of the male. I further saw that the two classes of ducks, the dipper and the diver class, never agree together. The diver class hates the dipper class and the dipper class hates the diver class. When hunting canvasbacks with mallard decoys, as a rule you are out of luck. The same holds true in using canvasback decoys hunting mallards.

The females of all species of ducks have practically the same coloring and I saw a chance to make a decoy that would act as a universal set attractive to all species of ducks. They are painted in the dull coloring of the female but carry no distinct breed. With these decoys I am set for any kind of duck. With the duck call I can make these decoys appear the same as the flock that is flying in front of the blind. I attribute much of my success as a hunter to this decoy.

Decoys should be large so they show at a distance. I prefer a decoy made out of a good grade of cork. They are light and set high on the water, making a very showy decoy. They are not as strong as wooden decoys and the hunter must be more careful with them. In rice beds with heavy vegetation they ride high and take a very little wind to cause movement. A decoy without movement

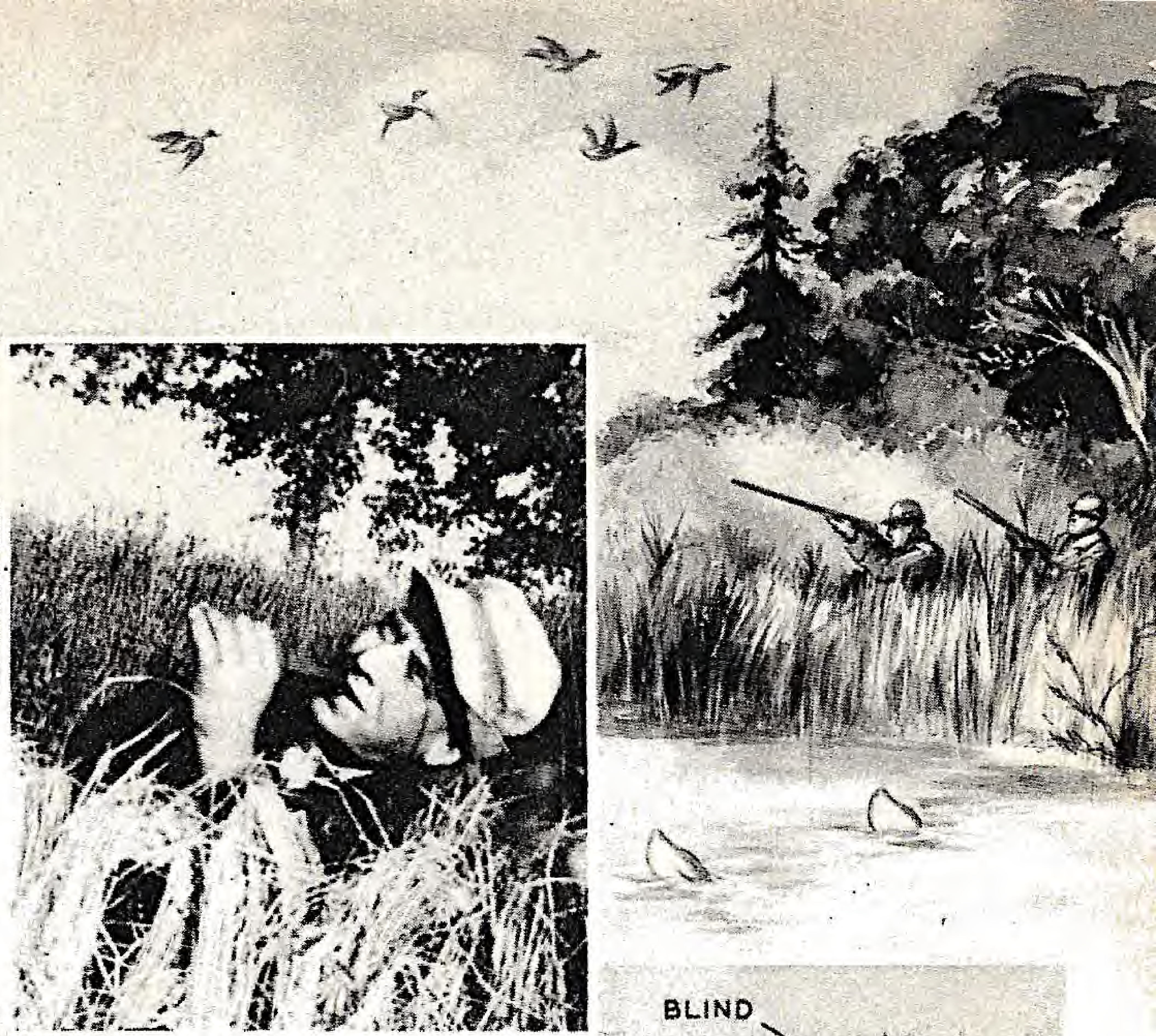
CAMPFIRE

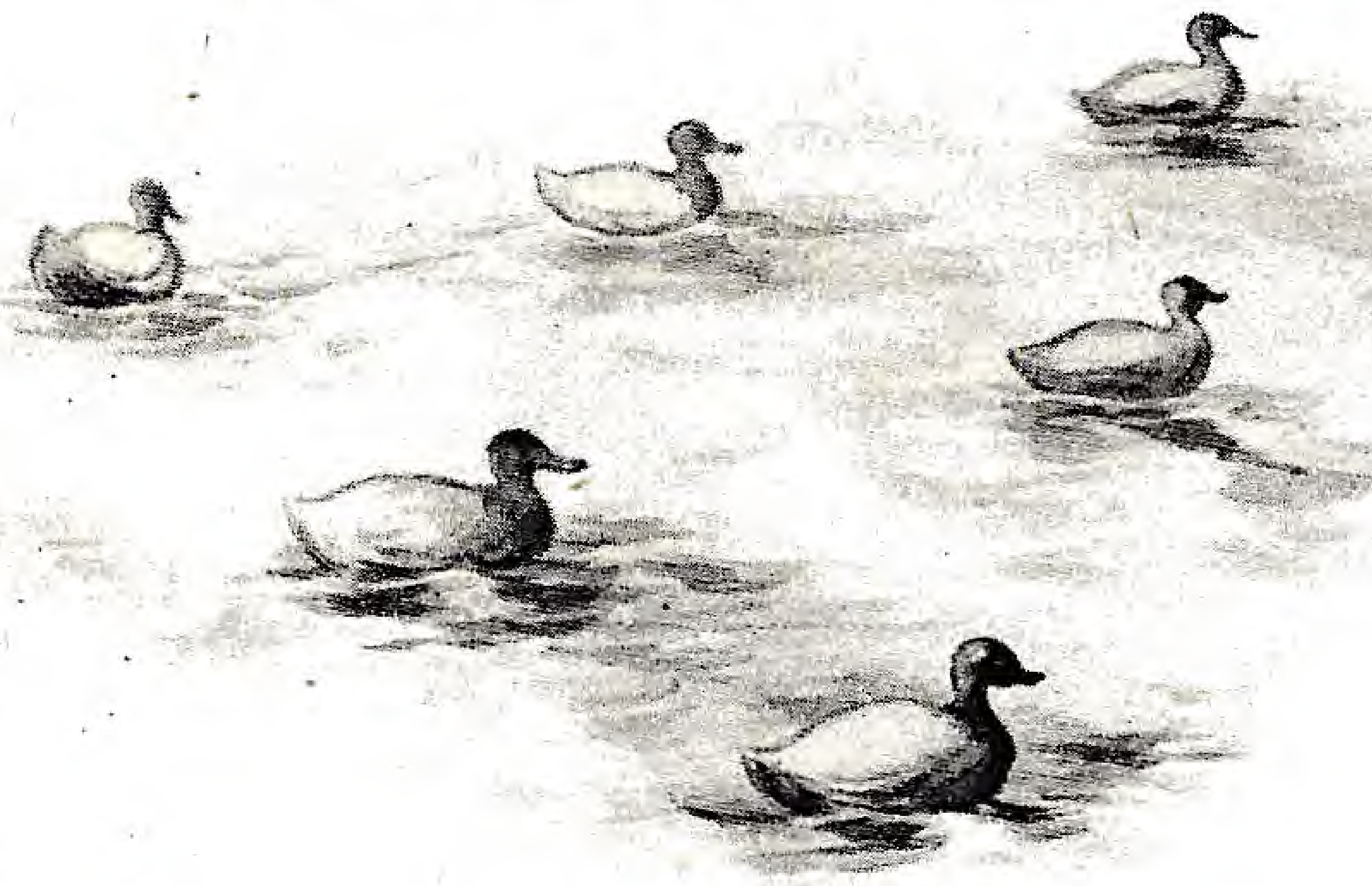
Decoys

by

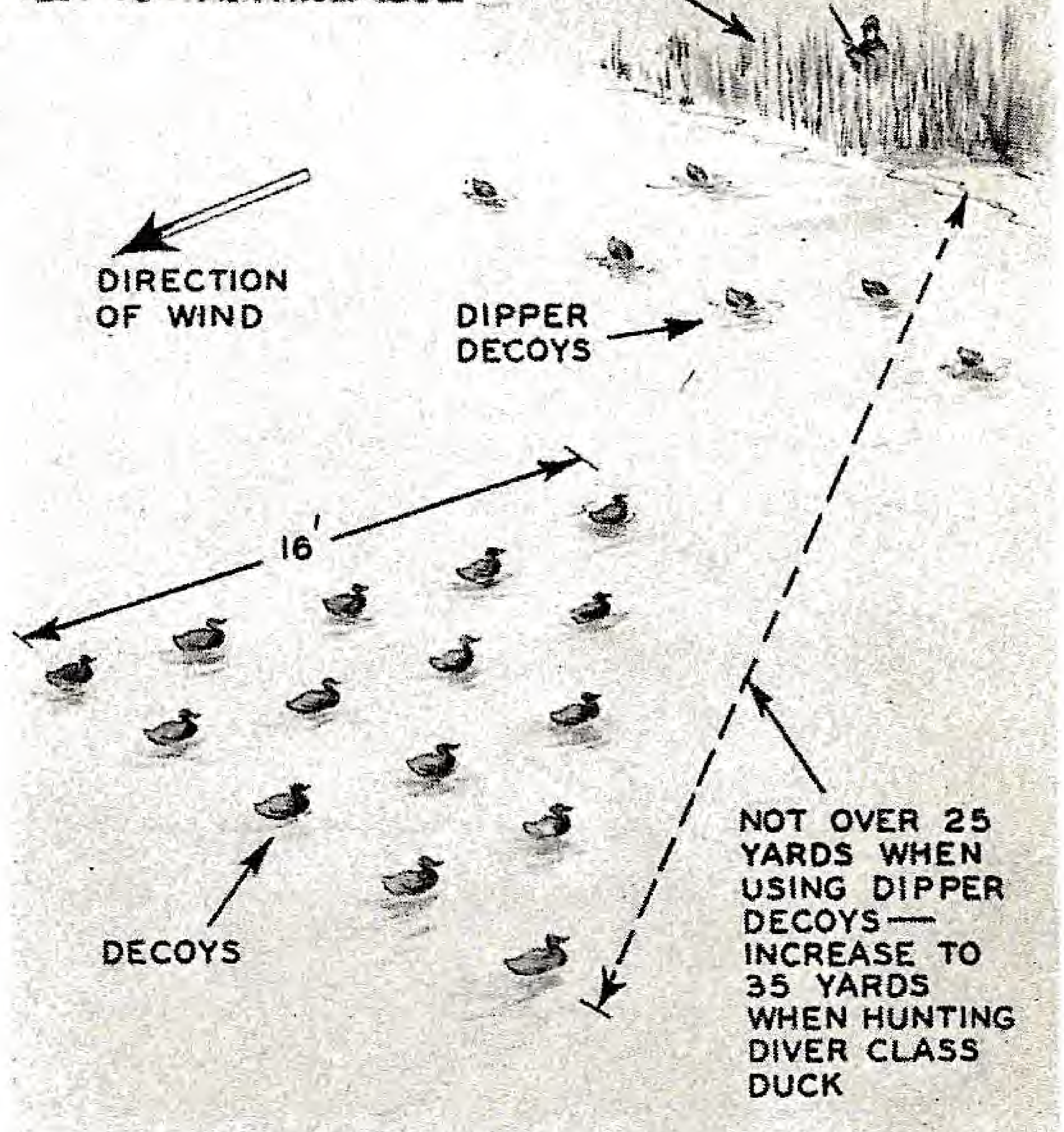
OSCAR QUAM,

Noted Hunter and Guide





Top—Decoys bobbing on the water in front of his blind, Oscar Quam, veteran hunter and guide, exercises his skill as a duck caller to entice passing flock into alighting. Bottom—Method of placing decoys with relation to wind and blind.


BLIND
DIRECTION OF WIND
DIPPER DECOYS
16'
DECOYS
NOT OVER 25 YARDS WHEN USING DIPPER DECOYS—INCREASE TO 35 YARDS WHEN HUNTING DIVER CLASS DUCK

loses its effectiveness. Off a windy point these decoys ride over the waves and can be seen clearly. Heavy wooden decoys dive into the waves and become invisible.

Decoys that are cut flat with a large resting place on the water are impossible to weight so they will right themselves in water. On a windy day the waves will turn them over and they stay in that position. Decoys should be cut like that of the old style decoy, the sides tapering down to where the weight is fastened. This insures easy movement of decoy as well as a guard against the decoy not righting itself when the wind and waves turn it over.

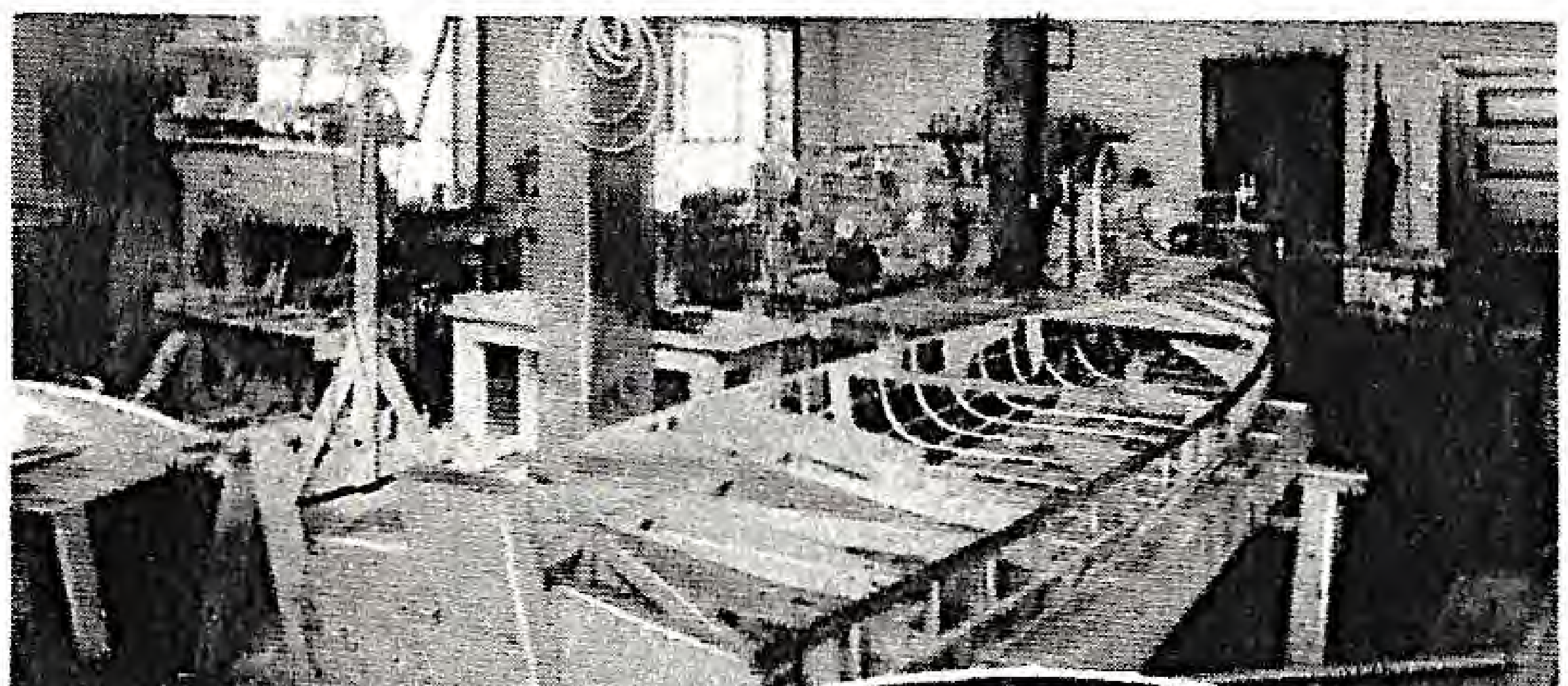
If a duck hunter has been observing he will have noticed a flock of ducks lighting on the water, the lead duck first, behind the leader 2 alight, 3 back of the two, and so on. They light in formation and in a very compact group.

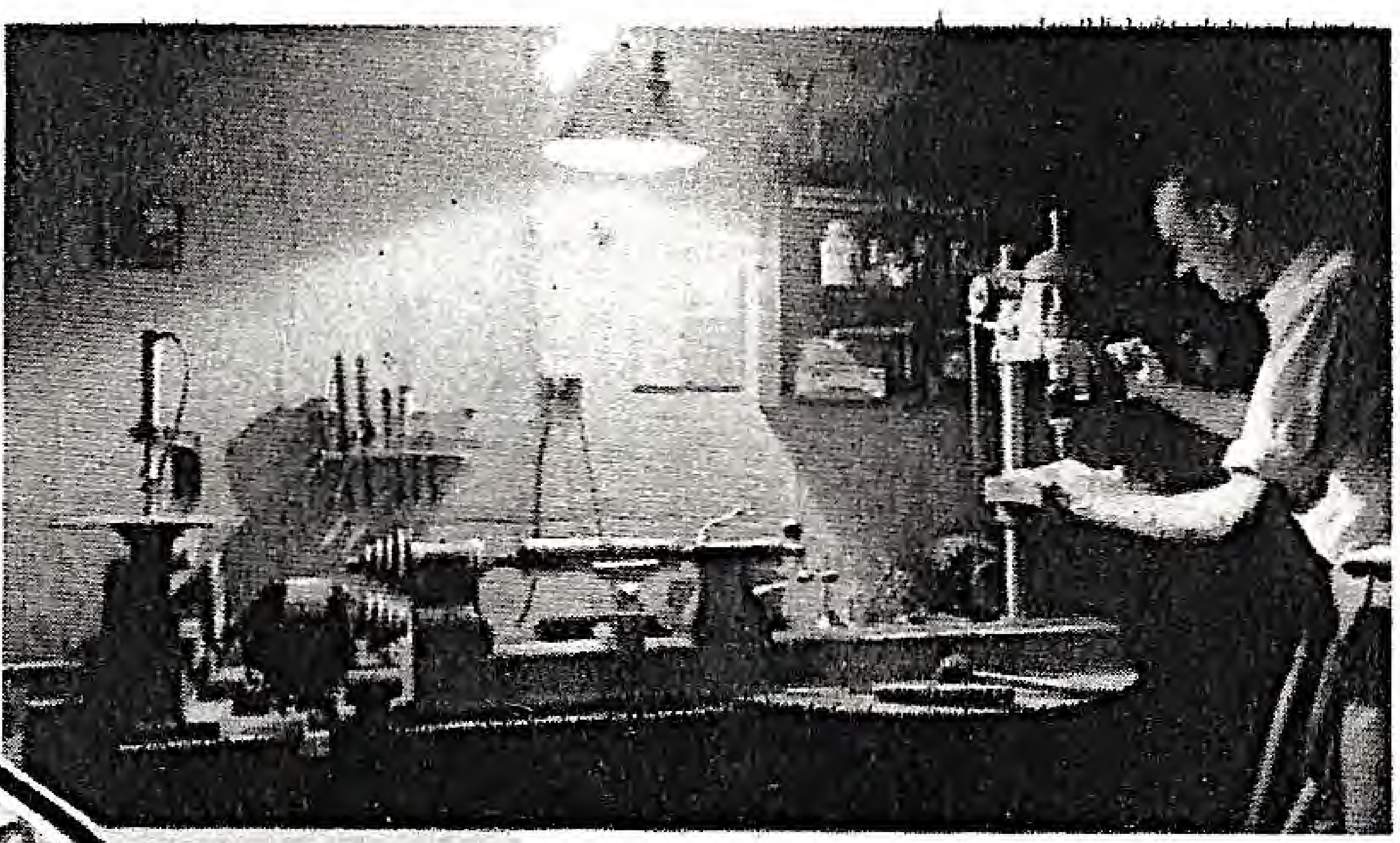
In my decoy set I carry this formation out in every way. Fifteen decoys should be set inside a 16-foot triangle, and set in the following formation: the outer row should contain five decoys in a line, set two and one-half feet apart, next row four decoys, next three, and so on. This makes a 5-4-3-2-1 or a fifteen decoy set. Between these decoys and the blind I place six dipper decoys. Dipper decoys are half decoys, balanced in an upright position, giving the effect of a duck dipping down and feeding. This formation gives the effect of the fifteen decoys swimming up to the dipper decoys that are feeding.

As a decoy set for the northern hunter to start the season with, I would suggest this fifteen decoy set plus the six dipper decoys. As the season nears the time of migration and the ducks appear in larger flocks, I would

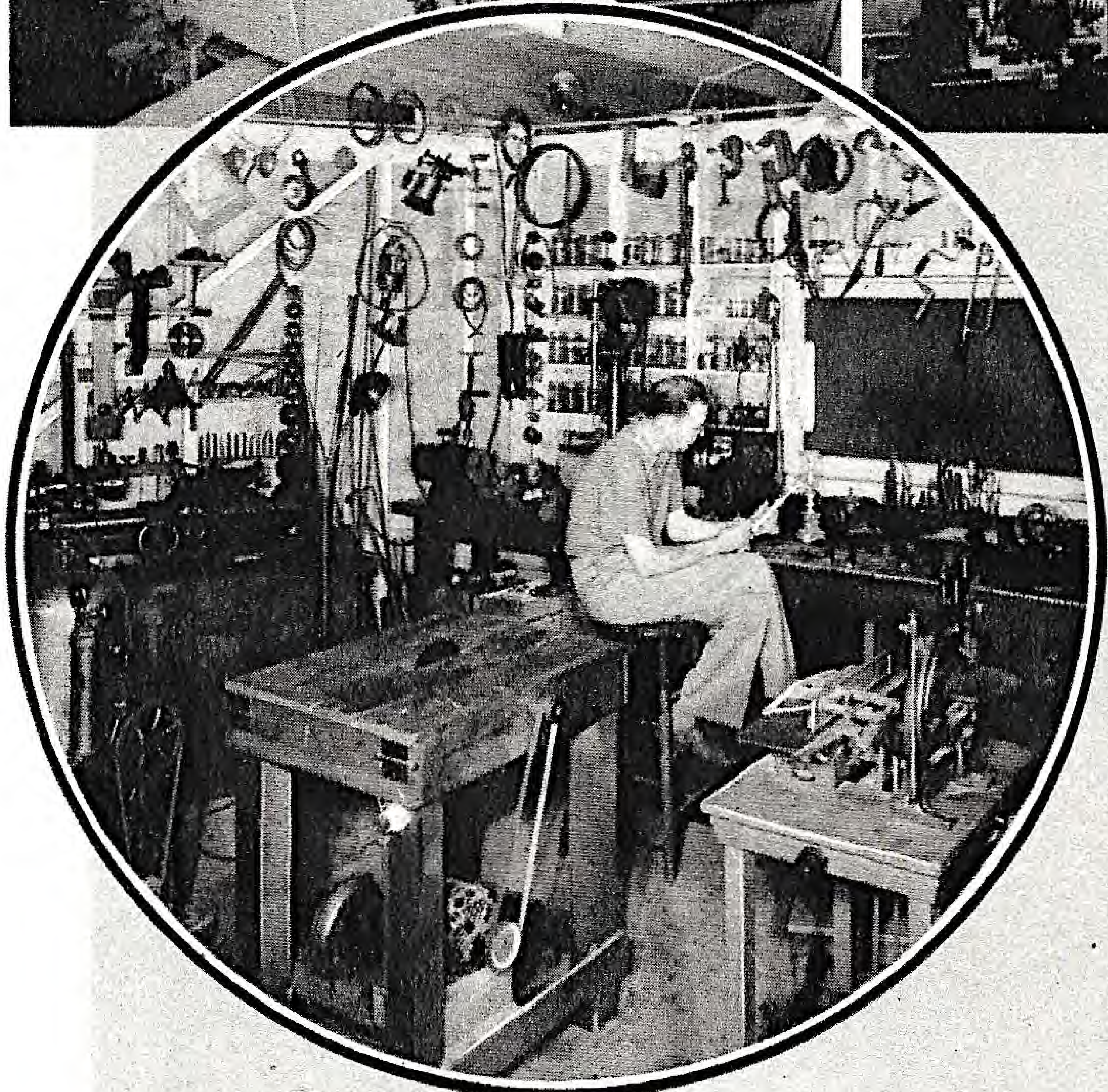
[*Continued on page* 132]

ANNOUNCING The WINNERS In MM'S HOME WORKSHOP PHOTO CONTEST

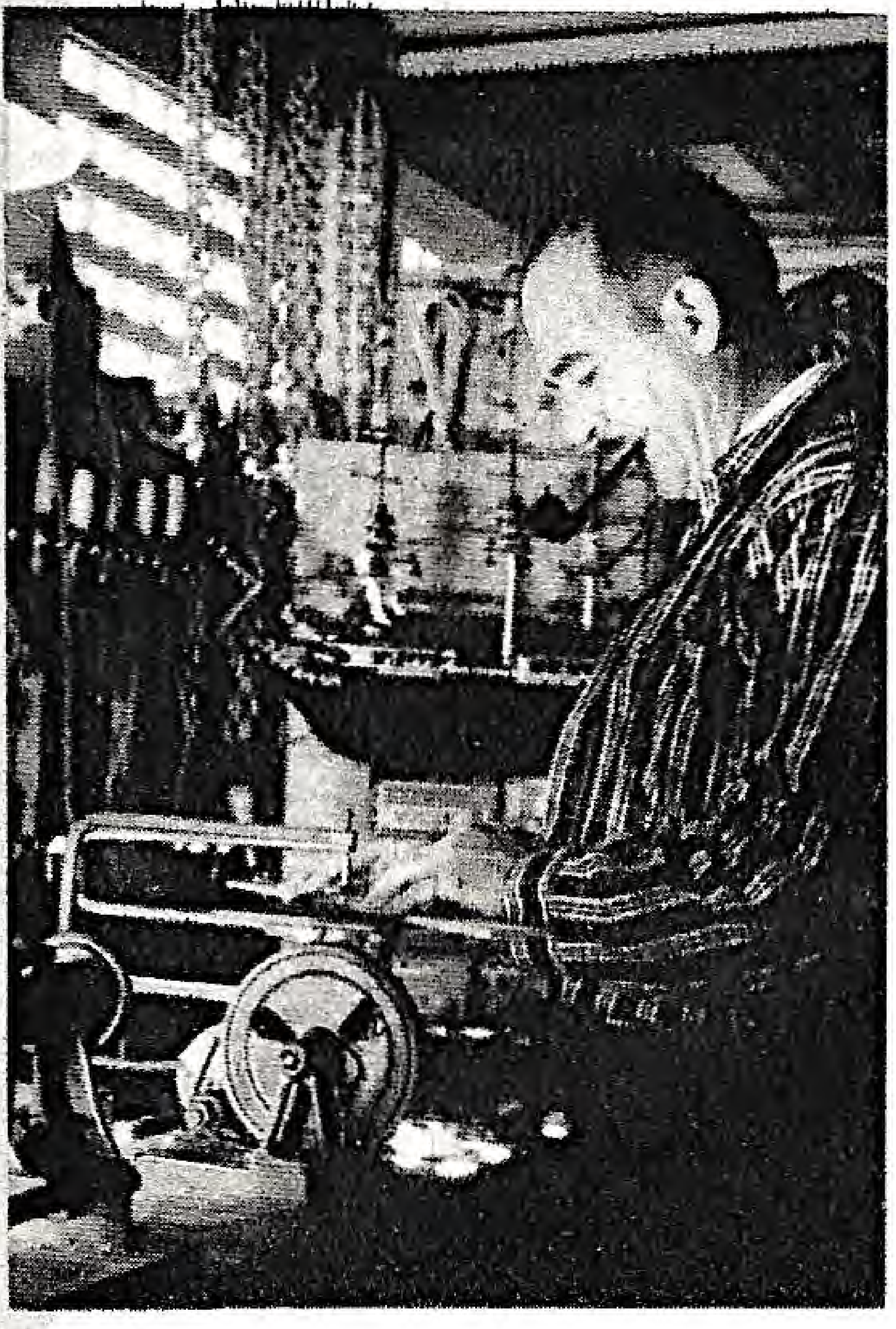


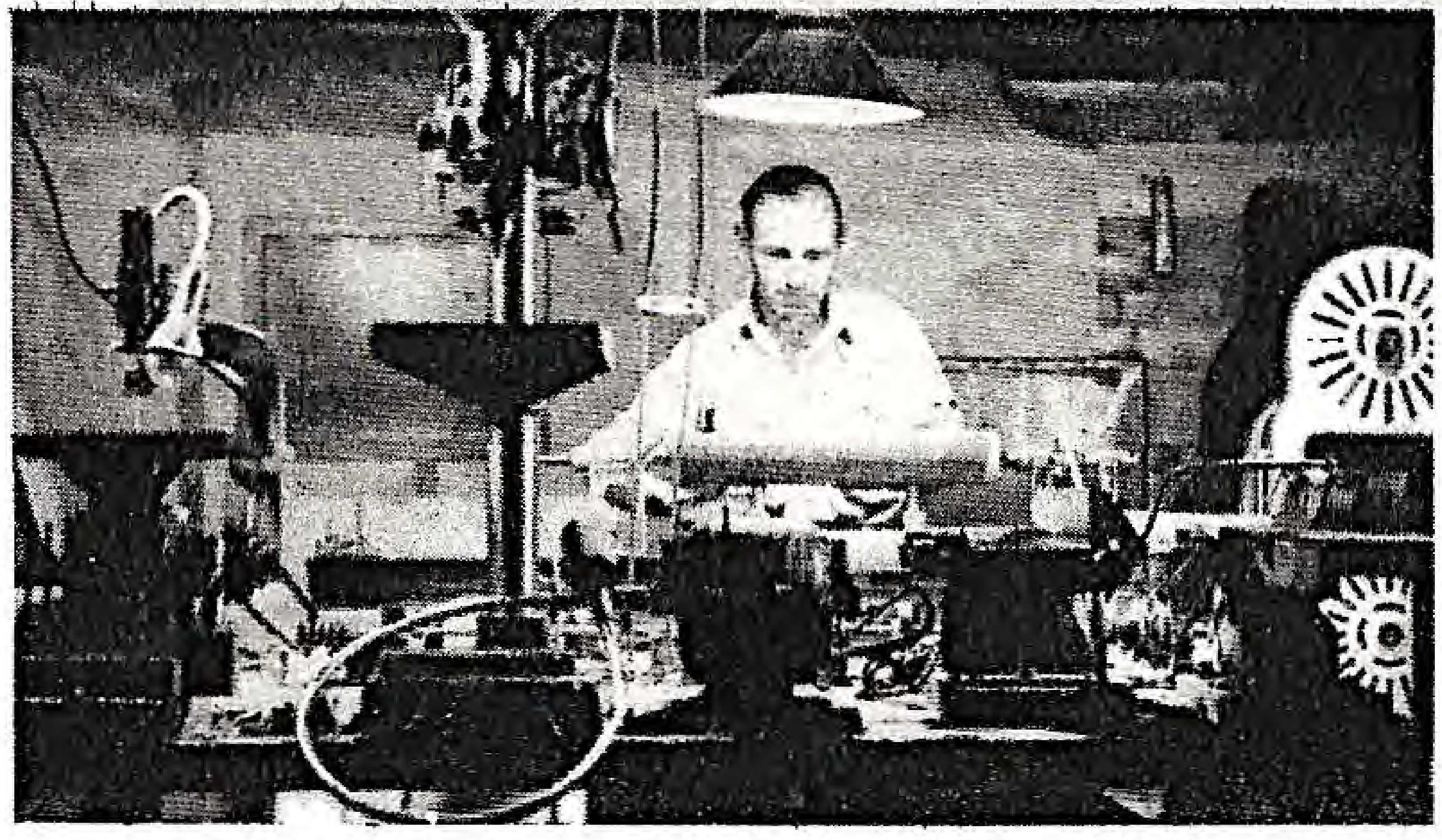


The workshop shown at upper left earned for L. A. Cowles, of Rochester, Minn., the $5 award in MM's Home Workshop Photo Contest. One of Mr. Cowles projects appears in the foreground. Directly above is the workshop of Willy Schmidt, Chicago, Ill. Below is the shop of F. Roy Johnston, of Honolulu, Hawaii. The latter are third prize winners.



Here is the first prize winner in Workshop Photo Contest. Its owner, Sam Little, of Hollywood, California, is shown putting the finishing touches on a metal turning project. Mr. Little received the $15 award.





Another third prize winner is G. Whiting, of Olds, Alberta, Canada, who submitted this interesting picture of him and his workshop. A single electric motor operates the compact machine set-up.

WITH entries received from all parts of the world selection of the prize winners in the MM Home Workshop Photo Contest announced in the August issue proved a difficult task for the contest judges. Space permitted the publishing of only five of the winning pictures, but these clearly show what any man can do in his own garage, attic or basement. Prizes of one dollar each in addition to those above were also awarded to Kenneth Kay, Athens, Georgia, and Peter Hobbs, Trotville, N. C.

Training Faithful Eyes To Serve The Blind

TO THE blind, science has given such boons as phonograph recordings of famous books, the electric eye scanning machine which converts type into electric Braile impulses, the radio, and scores of other ingenious devices to bring light into darkness, but to the dog must go credit for the greatest boon given the blind to date.

The aftermath of the World War found thousands of soldiers permanently blinded. Seeking to alleviate their helplessness, Mrs. D. H. Eustis, an American living in Switzerland, began on a small scale, the task of educating dogs to act as eyes for the blind. In a few cases dogs trained by their own blind masters prior to the war had pointed to the success of such an endeavour.

She selected her dogs for their intelligence, strength, courage, and disposition. She chose the German Shepherd breed. Training began at the age of 14 months, and lasted three months. The dogs were not "trained" to obey commands; they were "educated" to think.

In 1929 Mrs. Eustis returned to America to head the Seeing Eye, as the training school is called. Since that time hundreds of dogs have graduated to take up their tasks.

One of the first steps in a dog's education is to avoid obstructions. Often such obstructions are not of a nature to interfere with the dog's progress but which do interfere with that of its master. Next comes lessons in avoiding traffic, pitfalls, curbstones, steps, and the like. He must learn to recognize signals from his master, and disobey them if commands might result in danger.

Mrs. Dorothy Eustis, who brought the Seeing Eye to this country, with three of her brilliant German Shepherd puppies.

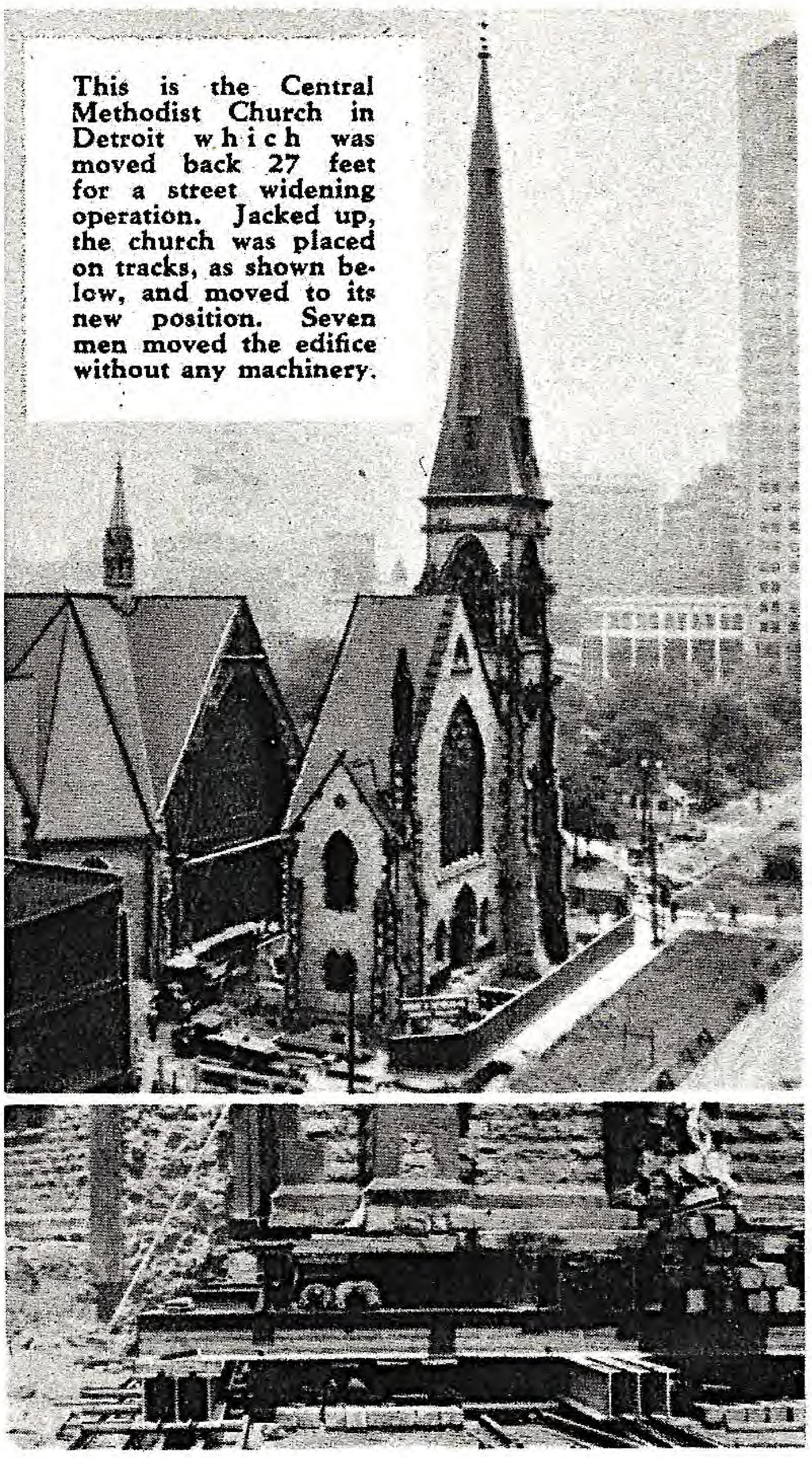
Photos by courtesy of Educational Pictures

Right—The dogs quickly learn to judge height. This one stopped short of the neck-high rope. Left, below—Unerringly the Seeing Eye graduate picks his way through dangerous obstructions.

Center circle—Stairways form an important item in the dogs' education. These three are with trainers. Below—The dogs show an almost uncanny ability to guide their masters through conjested traffic jams.

Church Cut In Half To Make Way For New Street

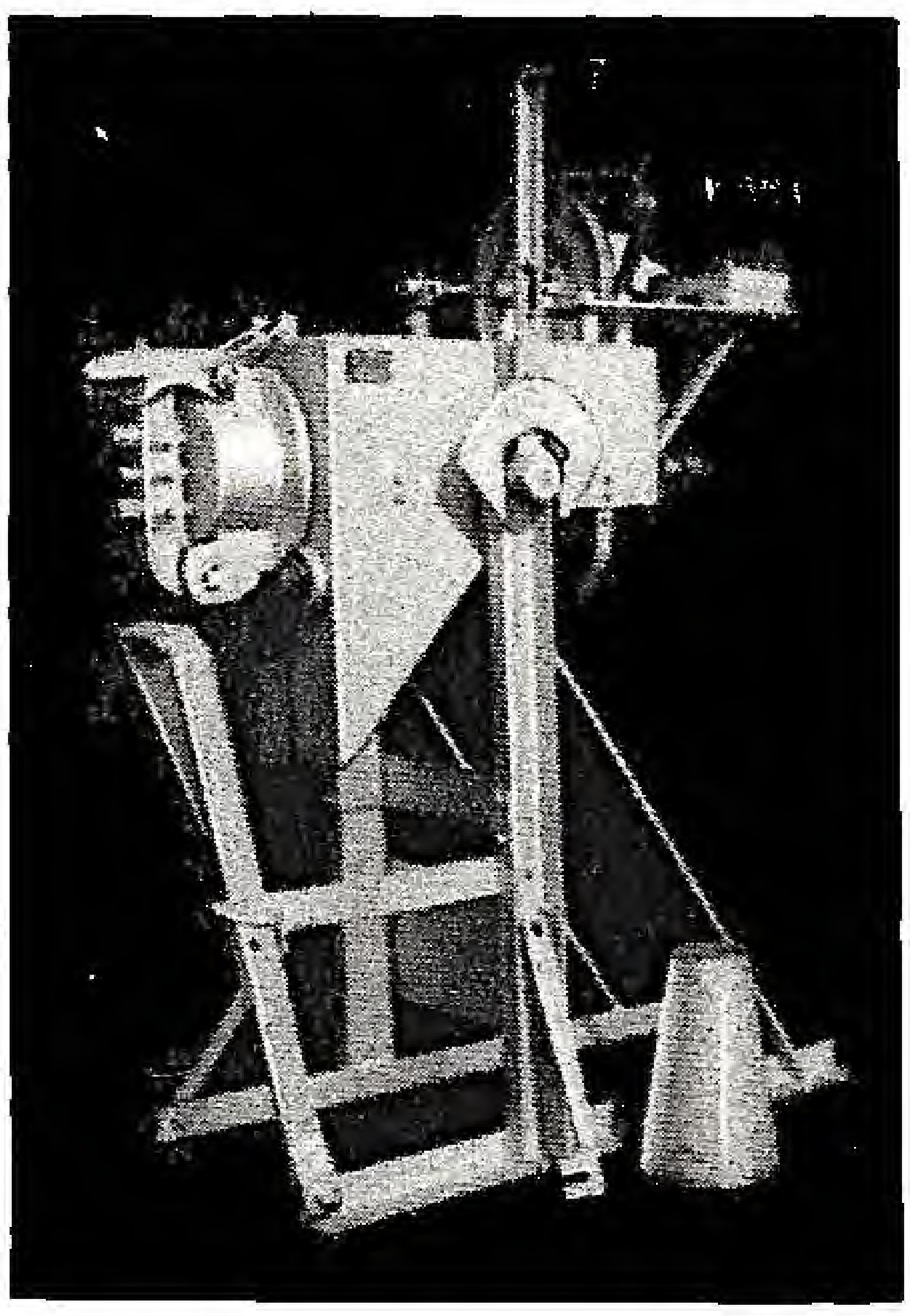
ONE of the most unusual engineering feats in recent years was the moving of a 4,000,000-pound Detroit church steeple to make way for a wider street. The 180-foot stone tower was moved by seven men while hundreds of breathless spectators looked on. Working under the direction of Carl F. Henrichsen and Carl A. Johnson, veteran building movers, the men first cut out a 27-foot section of the church so that the front could be moved back the same amount. The front portion was then jacked up and placed on skids. Inch by inch the structure was moved by man power until it was against the rear portion of the church after which the skids were removed and foundation cemented fast. Due to danger of the slightest jar toppling steeple, it was necessary to eliminate all machinery.



This is the Central Methodist Church in Detroit which was moved back 27 feet for a street widening operation. Jacked up, the church was placed on tracks, as shown below, and moved to its new position. Seven men moved the edifice without any machinery.

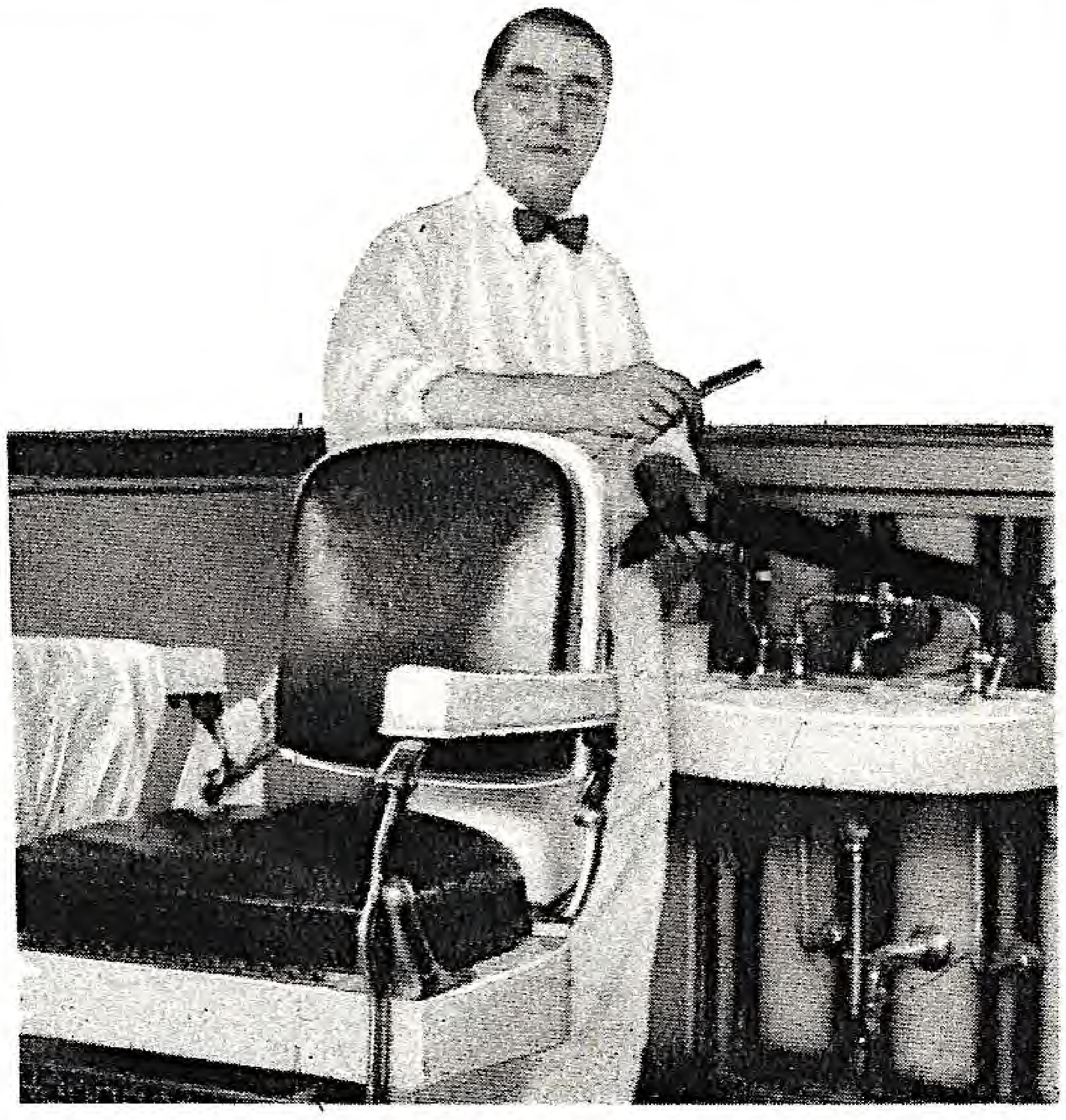
Portable Unit Puffs Cereal Grains

DESIGNED especially for light manufacturing, a new machine recently introduced by a Portland, Oregon, manufacturer converts wheat and rice grains into a delightful breakfast cereal. Four quarts of dry grain when exploded makes about one bushel of breakfast food. The machine can be operated by one person and will produce $120 worth of merchandise per day. An electric motor operates the device.



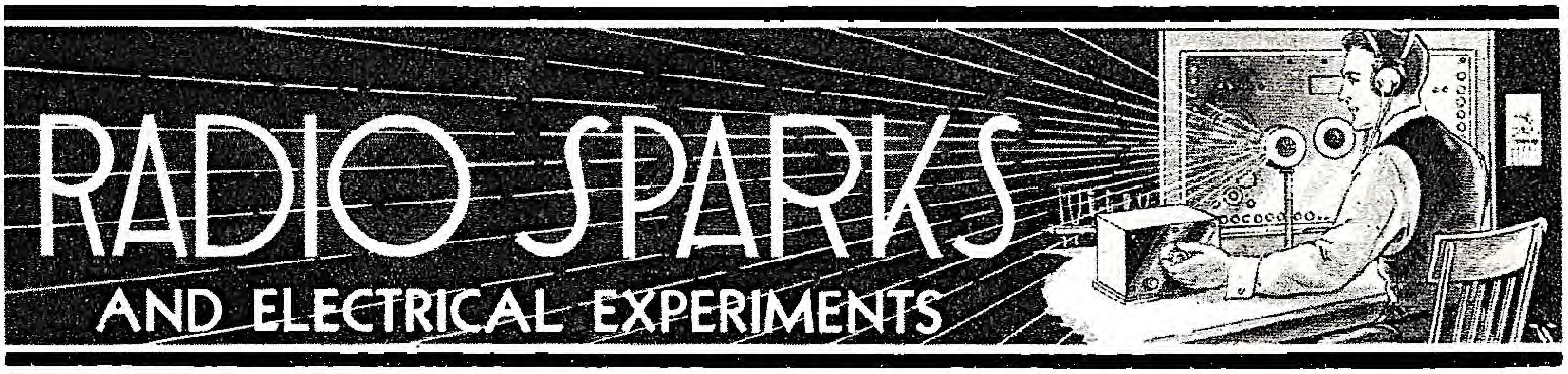
Simple enough for home production the grain exploder shown here produces delicious cereal from whole wheat and rice grains.

Barber Invents Wood Razor Strop



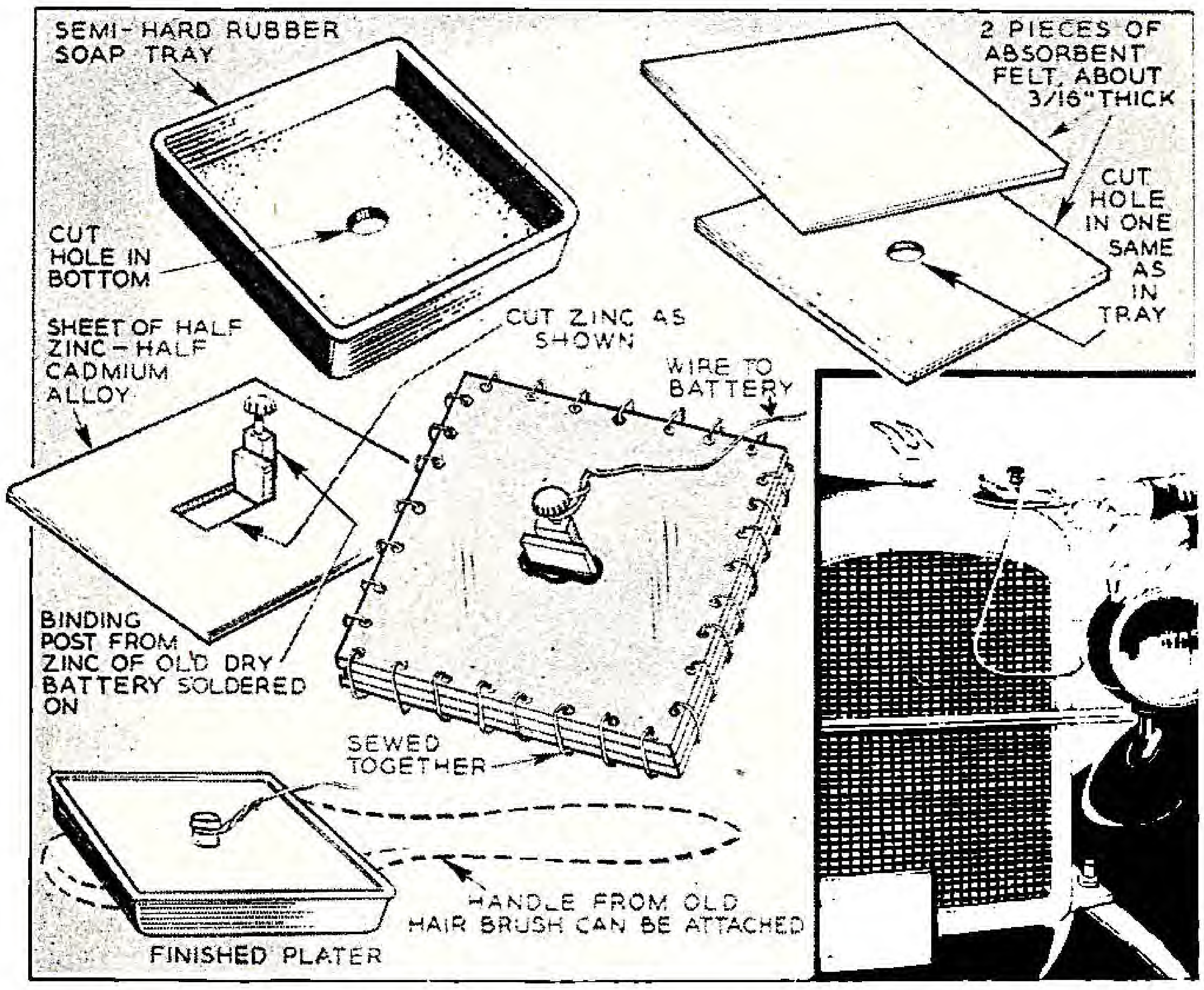
Lyle Wosepka, Britton, South Dakota barber, poses with his synthetic razor strop. Manufactured under secret process the strop is composed of specially treated wood fiber material.

A RAZOR strop with all of the features of the conventional leather product has been perfected from wood fiber by Lyle Wosepka, a Britton, South Dakota, barber. Manufactured under a secret process the strop consists chiefly of a base of woody tissue first treated with a combination antiseptic and coloring compound and later with a preservative outer covering.



RADIO SPARKS
AND ELECTRICAL EXPERIMENTS

Electroplate Metal With ELECTRO-PAD Plater


SEMI-HARD RUBBER SOAP TRAY
2 PIECES OF ABSORBENT FELT, ABOUT 3/16" THICK
CUT HOLE IN BOTTOM
CUT HOLE IN ONE SAME AS IN TRAY
SHEET OF HALF ZINC-HALF CADMIUM ALLOY
CUT ZINC AS SHOWN
WIRE TO BATTERY
BINDING POST FROM ZINC OF OLD DRY BATTERY SOLDERED ON
SEWED TOGETHER
HANDLE FROM OLD HAIR BRUSH CAN BE ATTACHED
FINISHED PLATER

Dull nickeled parts can be given a shining new finish with this battery operated electroplater. The plating pad consists of a zinc-cadmium plate inserted between felt pads and assembled in a flexible rubber soap tray.

COSTING only a few cents to make this handy electroplating pad will quickly put a shining new surface on dulled metal parts that will equal many commercial plating finishes. The plating is flowed on with a simple pad which operates off a six-volt storage battery making the device completely portable.

First secure a flexible rubber soap tray, such as is obtainable in a 10-cent store, and cut a small hole in the center large enough to pass a radio binding post terminal. Next cut a piece of zinc-cadmium alloy of ⅛-inch thickness just large enough to fit inside the soap tray. In the center of the alloy drill a hole large enough for the binding post screw to pass through. Now cut two sheets of thick absorbent felt slightly larger than the metal plate, punch a hole through one of the sheets for the binding post screw then sew the two together with the plate sandwiched between them. The pad is now placed in the rubber tray, the nut attached to the binding post to hold the unit fast. To use, dip the pad in the plating solution given below, attach the positive terminal to the binding post, negative to metal to be plated and flow on the plating.

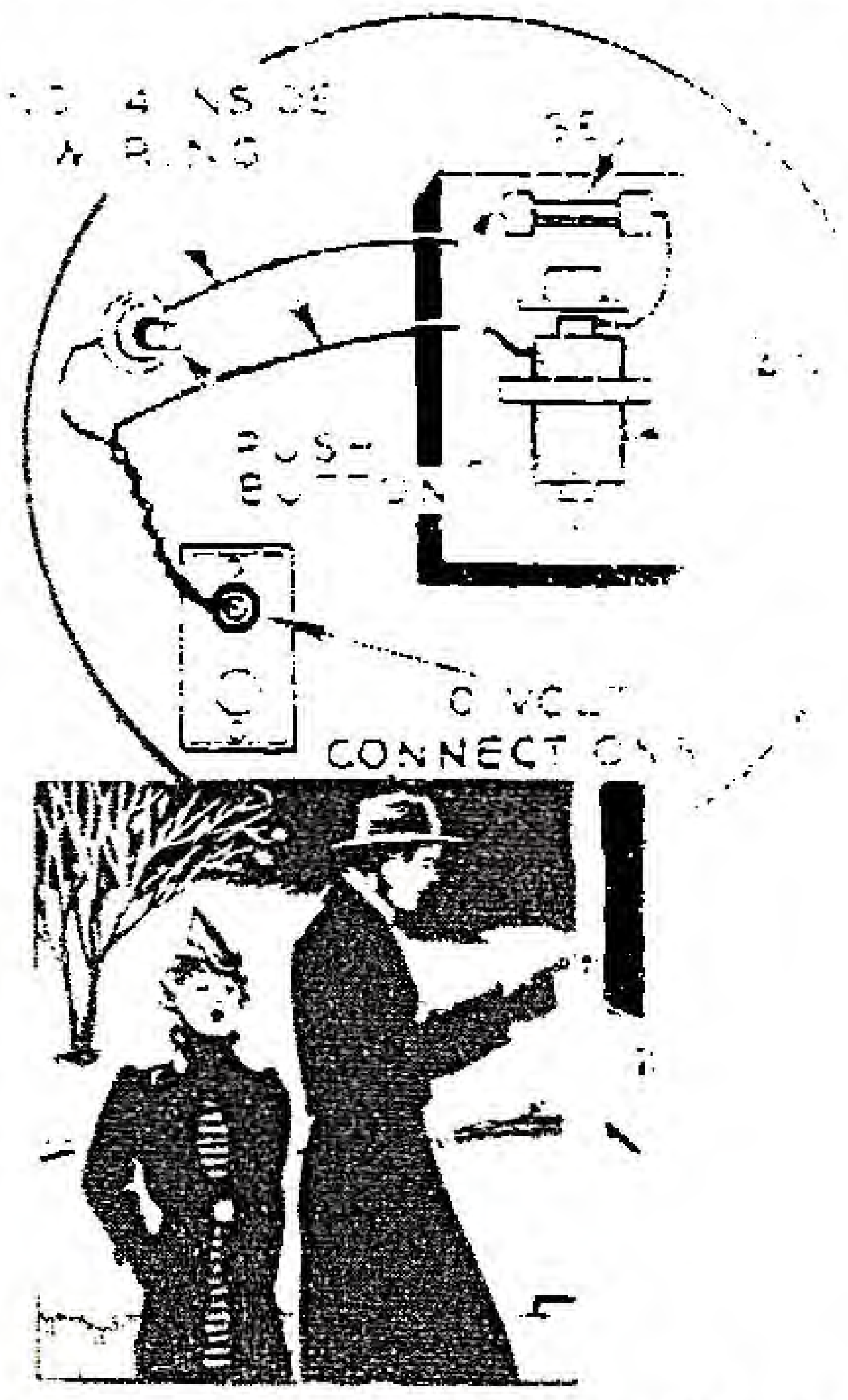
ELECTROPLATING SOLUTION

Add two oz. water to one oz. cadmium oxide until a creamy paste is formed. Next dissolve 2 oz. sodium cyanide, ¼ oz. sodium hydroxide and ¼ oz. zinc cyanide in boiling water and to this add the paste mixture plus four additional oz. water. This mixture should be mixed outdoors in earthenware crock. Don't inhale the fumes while mixing. Use when cool and store in a safe place as mixture is POISONOUS.

Before applying the plating pad to the metal surface first clean the metal with washing soda or kitchen cleanser so as to remove all rust, dirt and grease. Polish the plated surface with a cloth buffing wheel or flannel rag.

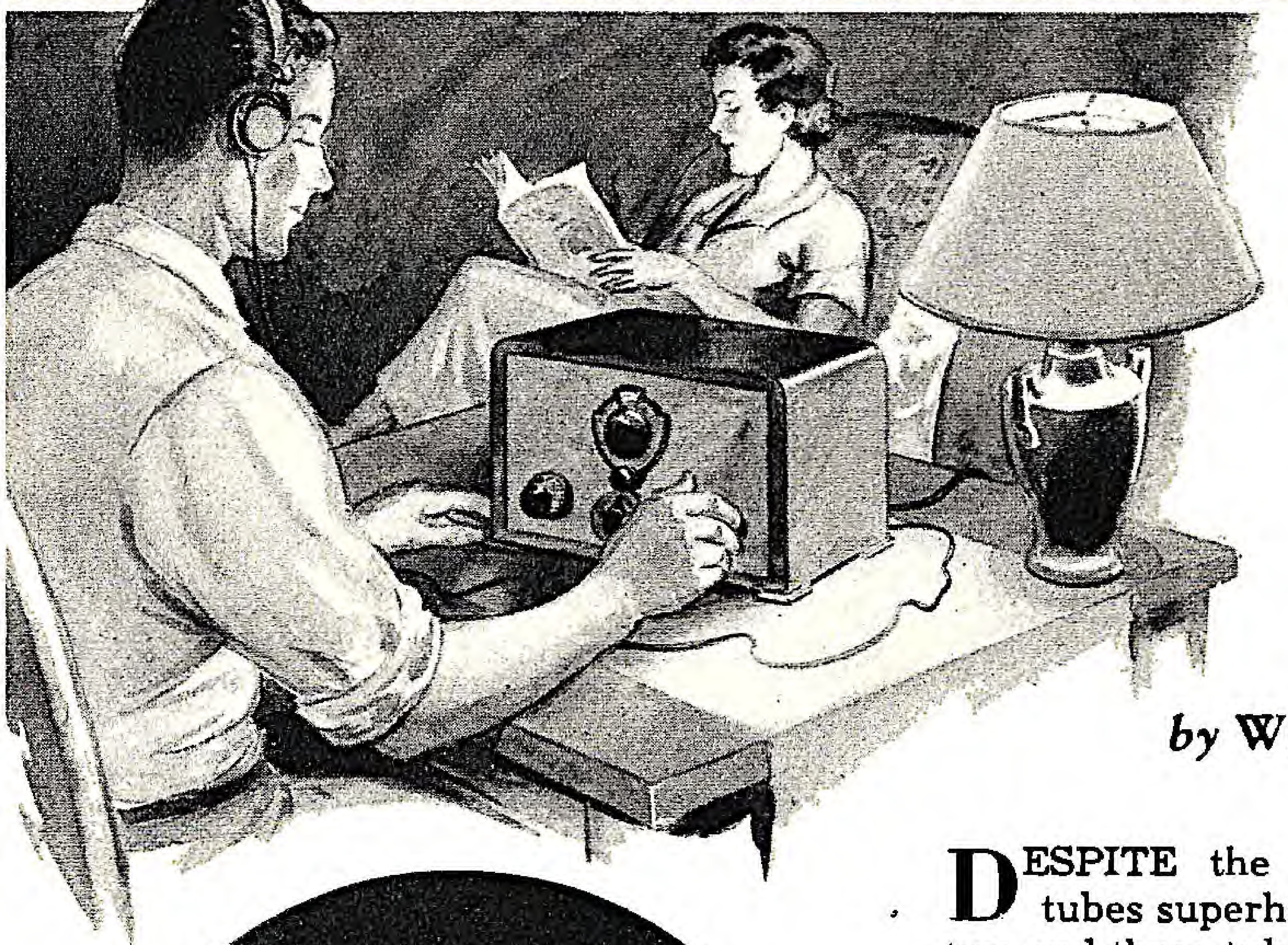
Spark Coil Is Handy Door Buzzer

THE secondary winding from an auto spark coil makes a practical door buzzer that works directly off the 110-volt current. Mount the coil to a block of wood. Over one end of the coil attach a tin strip so that when current passes through the coil it vibrates. A small fuse is attached as shown.


PUSH BUTTON

Operating directly off the 110 volt this simple auto spark coil door buzzer costs nothing to make.

Metal Tube "DX-ER" Features



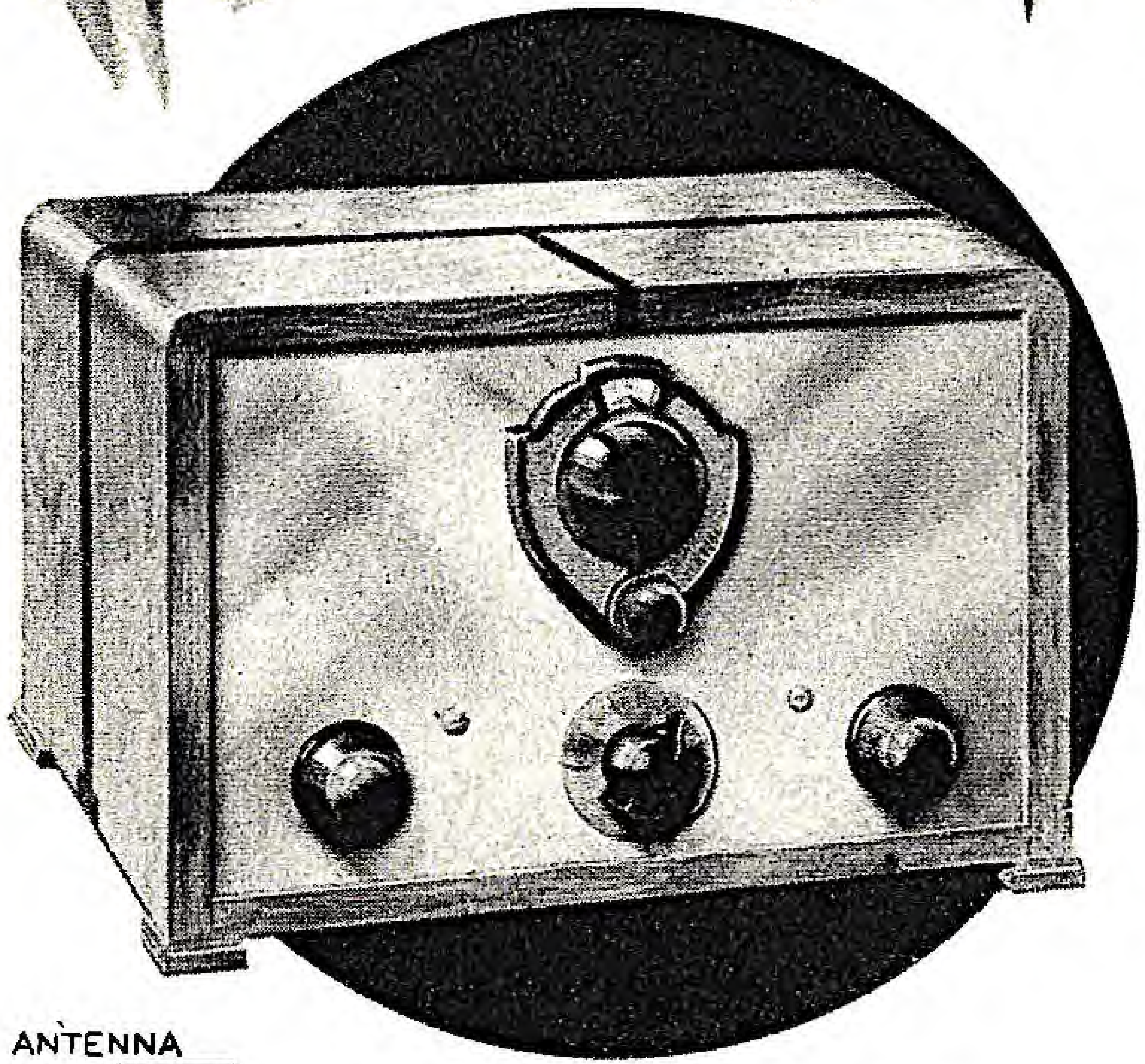
This modernized version of the popular regenerative set presents a new type of coil coupling and features band spread tuning and metal tubes

by WM. J. VETTE

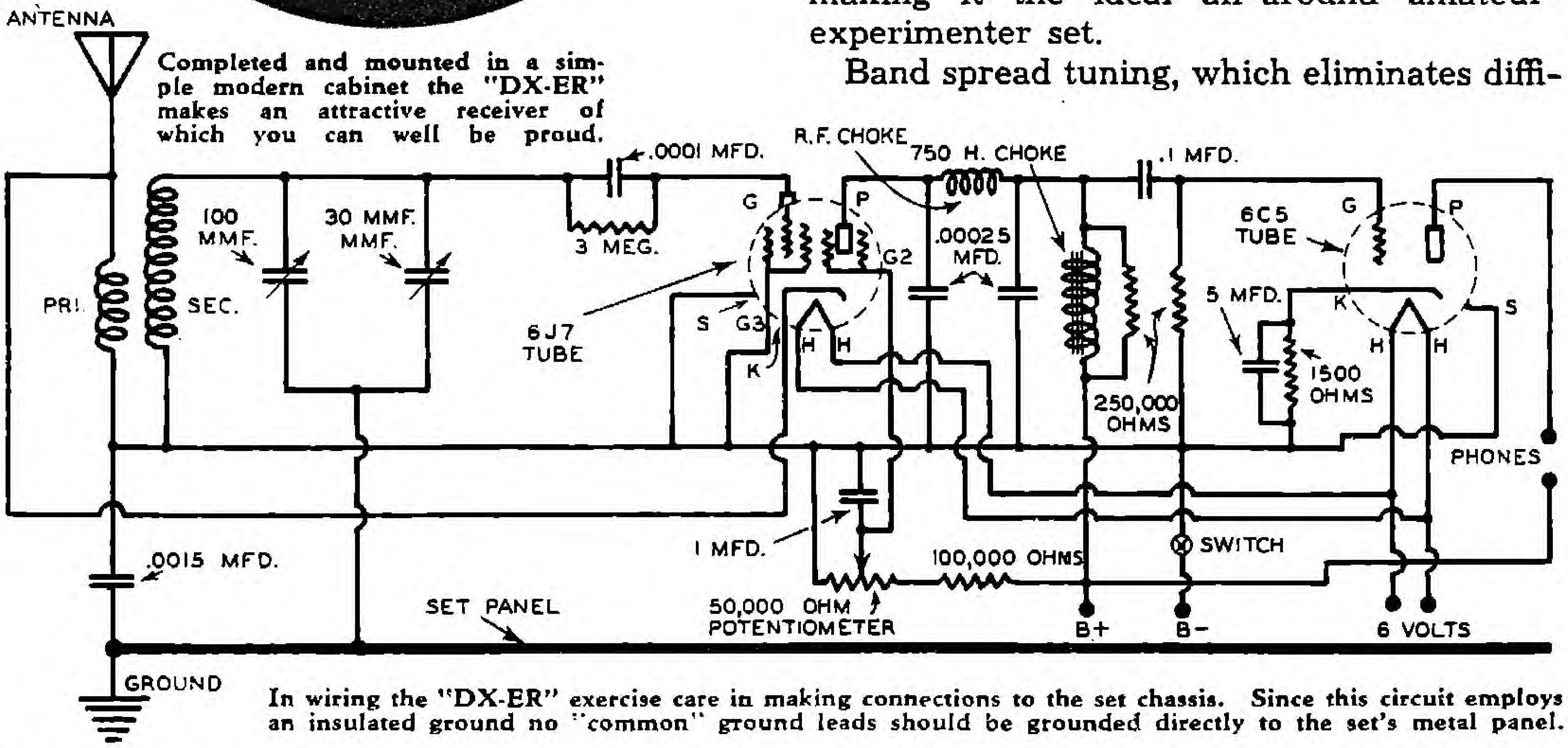
DESPITE the popularity of the multitubes superhetrodyne receivers the little two and three tube regenerative sets still find high favor among the amateurs and experimenters. The majority of these little sets when properly designed and built from good quality parts are capable of really surprising results. Just such a receiver is the "DX-ER" which, while very simple and compact, is capable of startling reception both with earphones and loudspeaker.

The reason often given for not building a simple receiver is that these sets usually lack certain features found only in de luxe sets. In this instance, though, the extra features have been incorporated into the circuit making it the ideal all-around amateur-experimenter set.

Band spread tuning, which eliminates diffi-



Completed and mounted in a simple modern cabinet the "DX-ER" makes an attractive receiver of which you can well be proud.



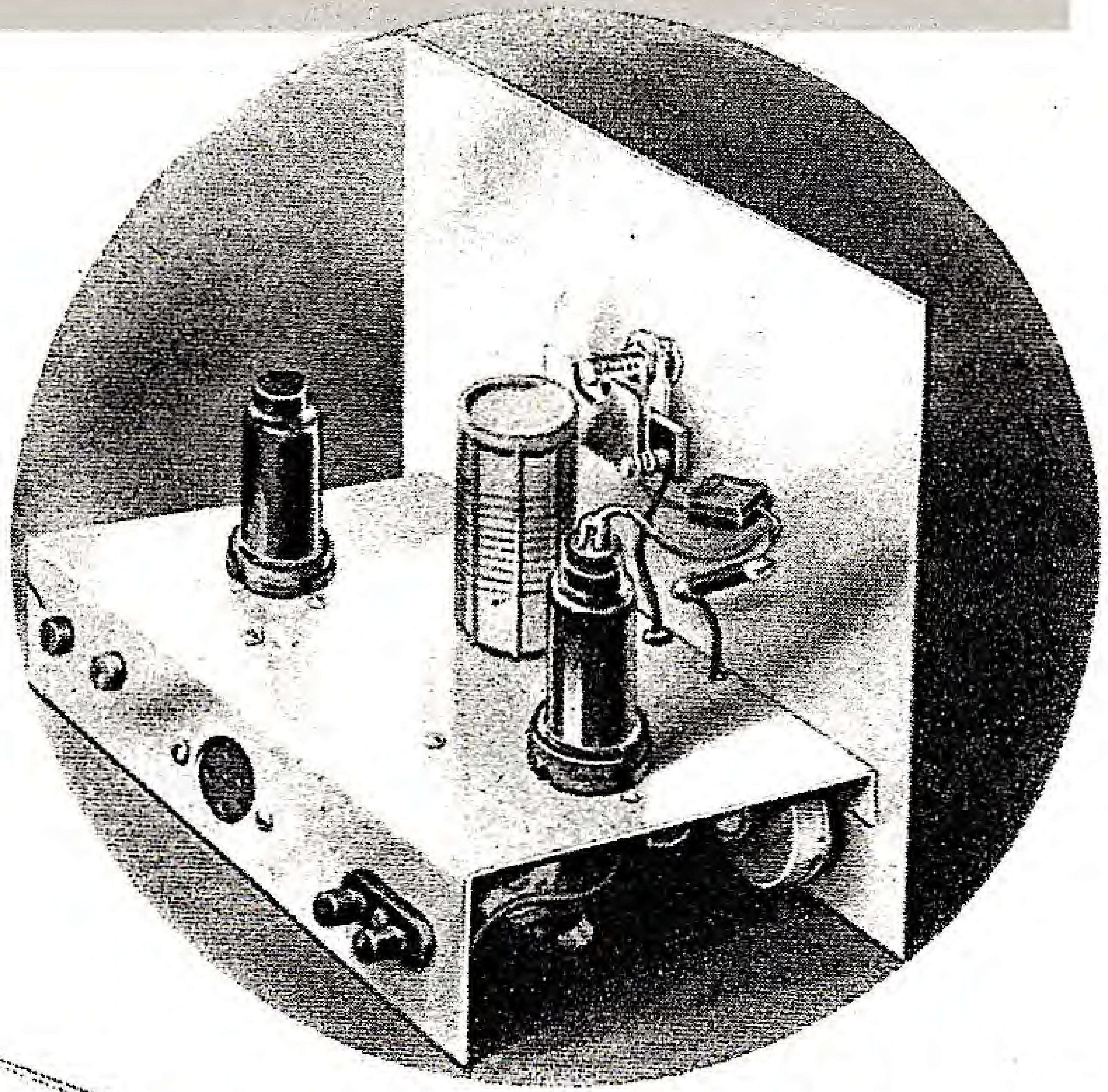
ANTENNA
PRI.
SEC.
100 MMF.
30 MMF. MMF.
.0001 MFD.
3 MEG.
6J7 TUBE
G
P
G2
S
G3
K
H
R.F. CHOKE
750 H. CHOKE
.00025 MFD.
.1 MFD.
250,000 OHMS
6C5 TUBE
5 MFD.
1500 OHMS
PHONES
.0015 MFD.
1 MFD.
100,000 OHMS
SWITCH
50,000 OHM POTENTIOMETER
SET PANEL
B+
B-
6 VOLTS
GROUND

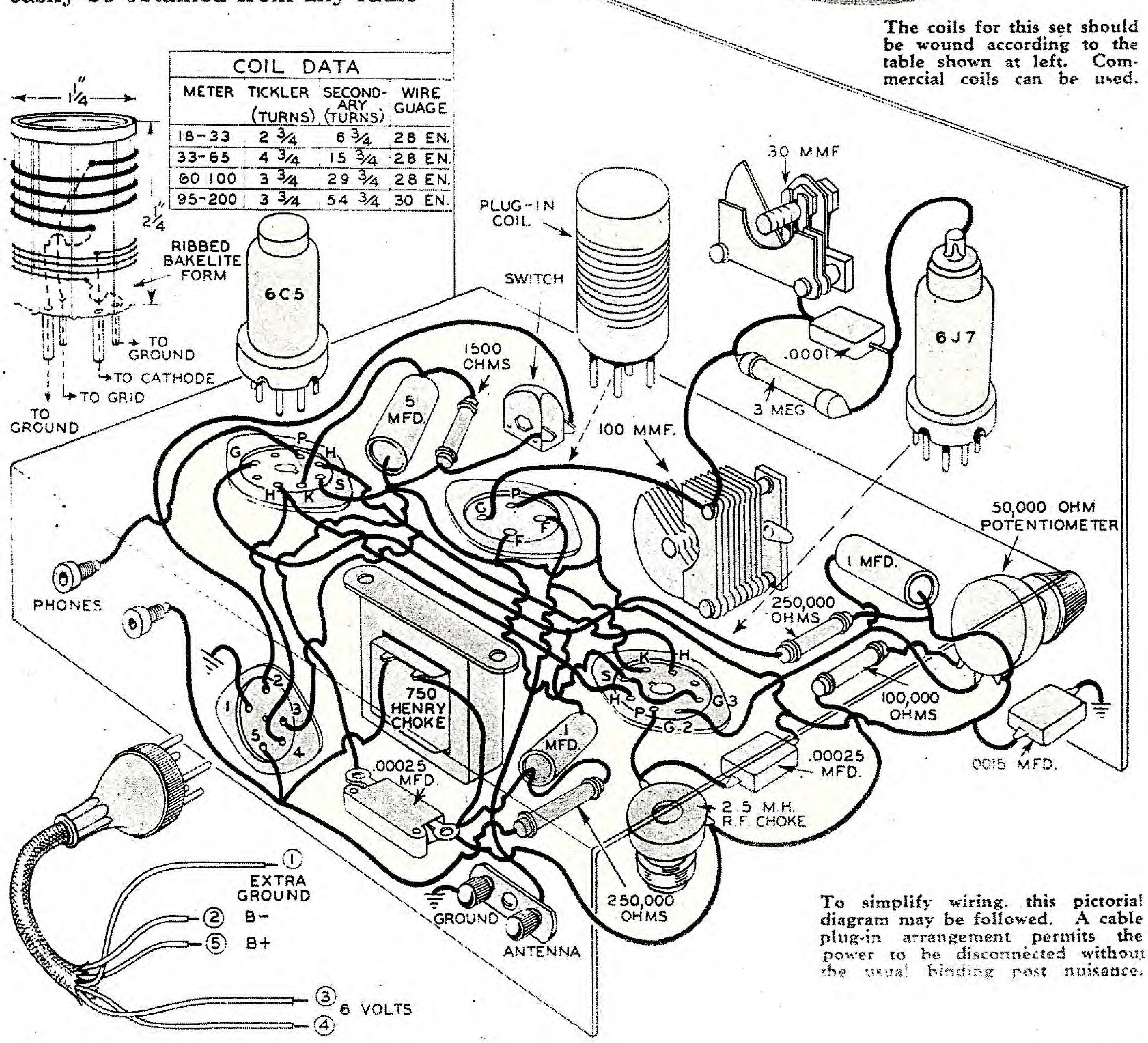
In wiring the "DX-ER" exercise care in making connections to the set chassis. Since this circuit employs an insulated ground no "common" ground leads should be grounded directly to the set's metal panel.

Band Spread All-Wave Tuning

cult tuning, metal tubes and electronic antenna coupling are a few of the features found on the "DX-ER." An auxiliary power supply permits the set to operate directly from 110-volt house current if battery operation is not desired.

The set is constructed on a chassis formed from sheet aluminum or alloy. While there is no definite size for the chassis it should be small enough so that parts can be mounted compactly. If the builder so desires he can secure a ready made chassis from any radio parts supply house with all socket and mounting holes already punched. The parts, which can easily be obtained from any radio



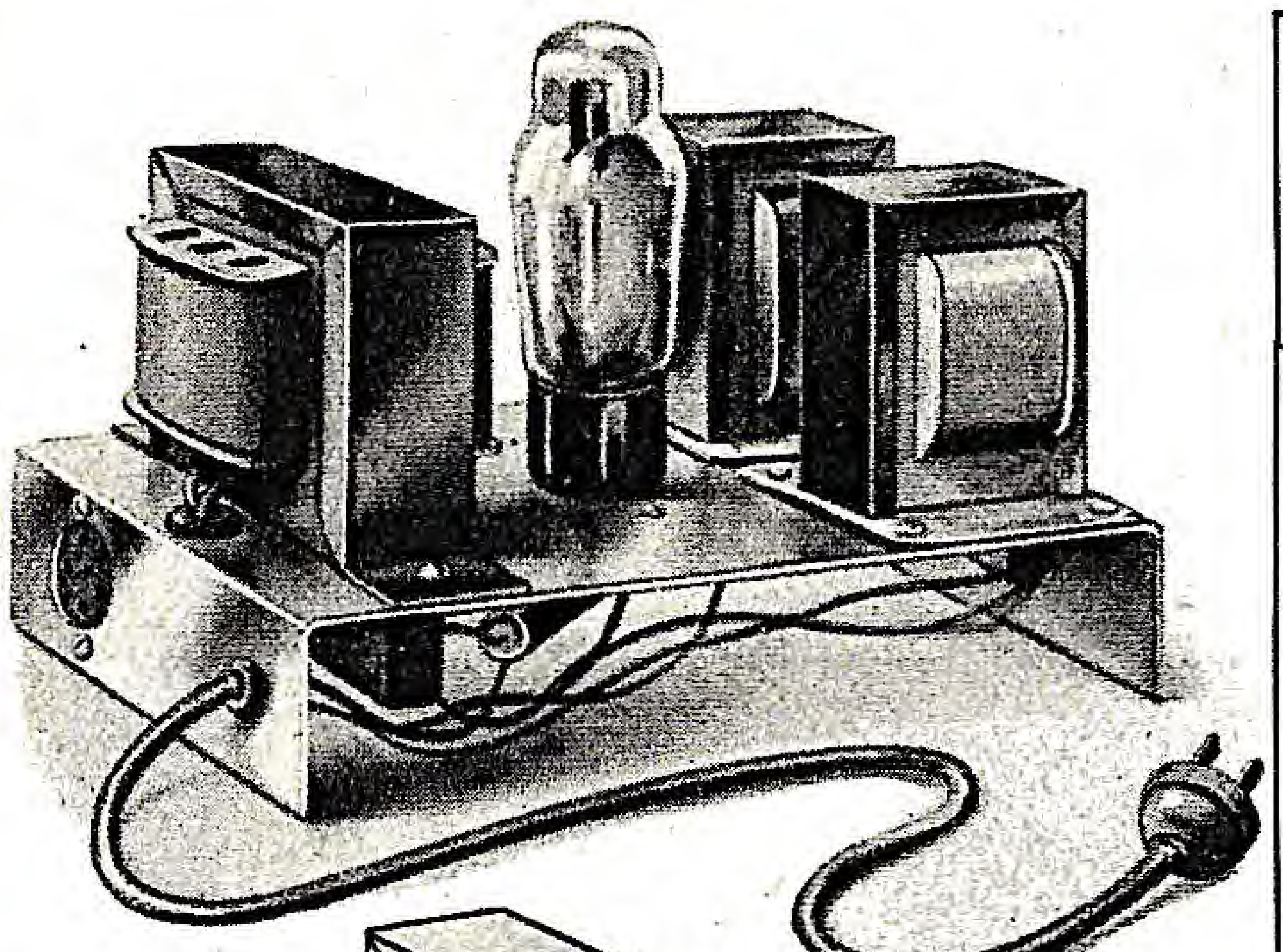

1¼"
2¼"
RIBBED BAKELITE FORM
TO GROUND
TO CATHODE
TO GRID
TO GROUND
6C5
PLUG-IN COIL
SWITCH
30 MMF
1500 OHMS
5 MFD.
.0001
3 MEG
6J7
100 MMF.
G
P
H
K
S
F
50,000 OHM POTENTIOMETER
1 MFD.
250,000 OHMS
PHONES
750 HENRY CHOKE
G3
G2
100,000 OHMS
.0015 MFD.
.00025 MFD.
1 MFD.
.00025 MFD.
2.5 M.H. R.F. CHOKE
250,000 OHMS
GROUND
ANTENNA
① EXTRA GROUND
② B-
⑤ B+
③ 6 VOLTS
④

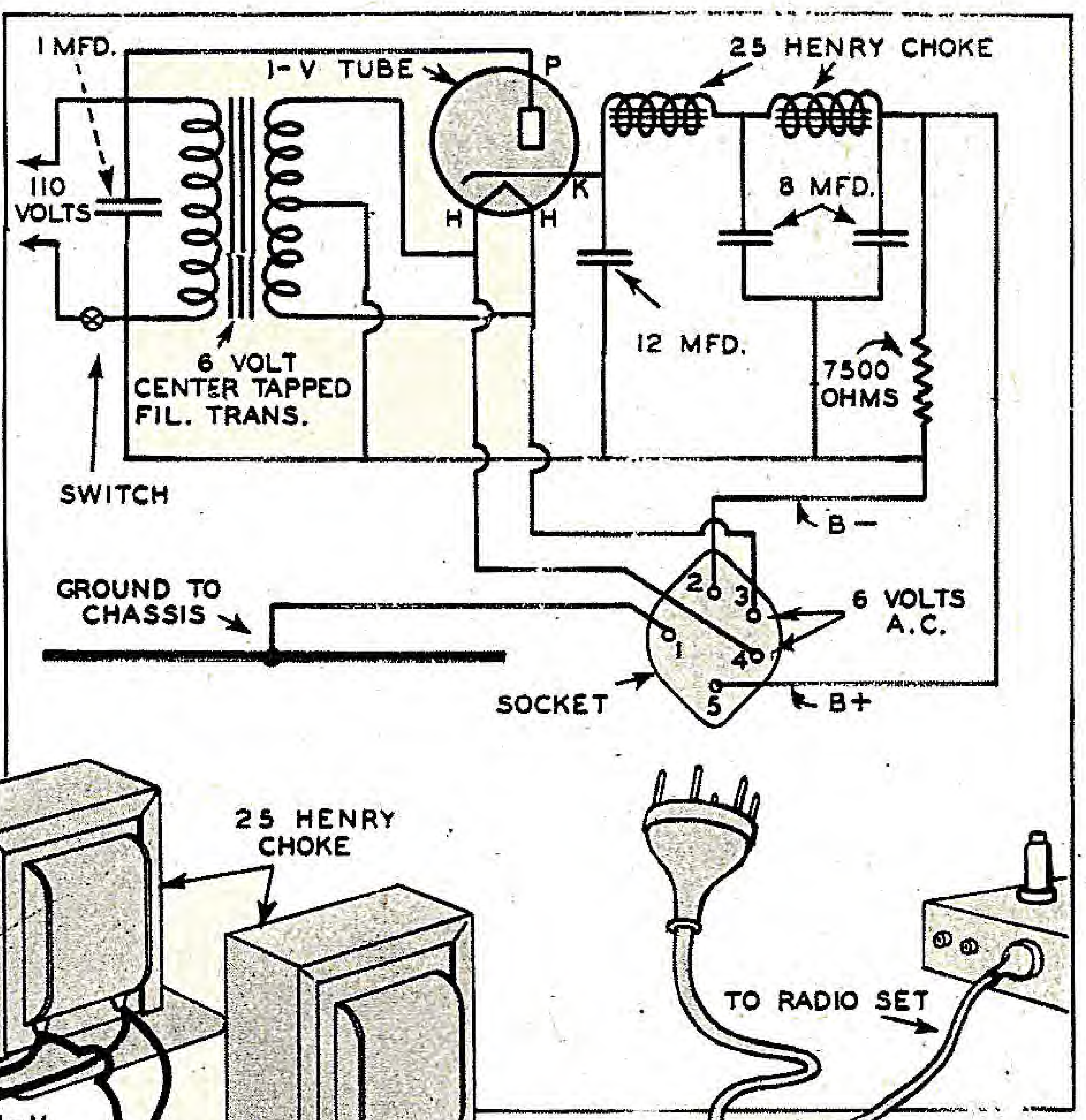
COIL DATA

METER	TICKLER (TURNS)	SECONDARY (TURNS)	WIRE GUAGE
18-33	2 ¾	6 ¾	28 EN.
33-65	4 ¾	15 ¾	28 EN.
60 100	3 ¾	29 ¾	28 EN.
95-200	3 ¾	54 ¾	30 EN.

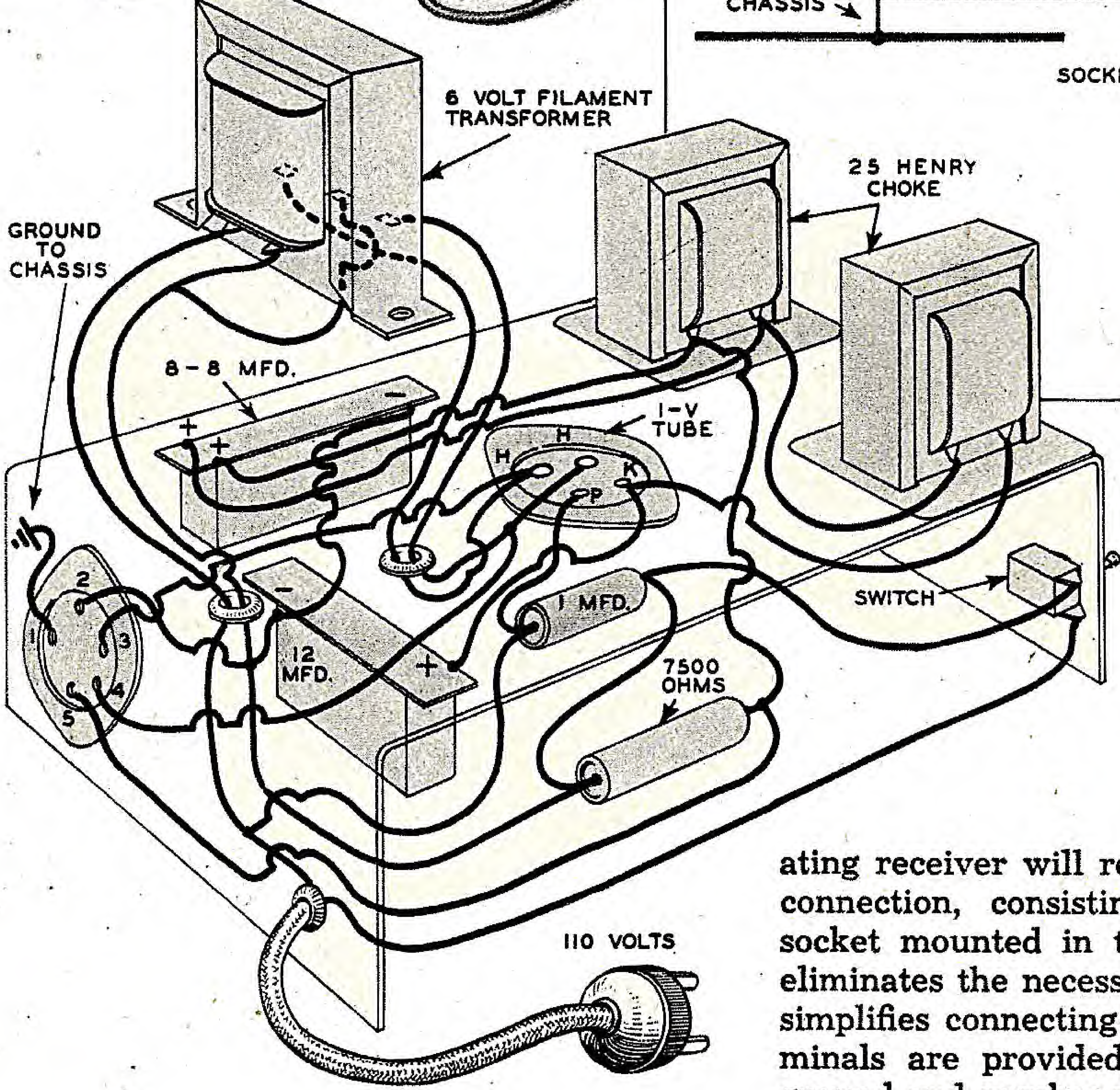
The coils for this set should be wound according to the table shown at left. Commercial coils can be used.

To simplify wiring, this pictorial diagram may be followed. A cable plug-in arrangement permits the power to be disconnected without the usual binding post nuisance.




I MFD.
1-V TUBE
P
25 HENRY CHOKE
110 VOLTS
8 MFD.
H
K
H
12 MFD.
6 VOLT CENTER TAPPED FIL. TRANS.
7500 OHMS
SWITCH
B−
GROUND TO CHASSIS
2
3
1
4
5
6 VOLTS A.C.
SOCKET
B+
TO RADIO SET

Besides being ideally suited for use with the "DX-ER" this simple power supply can be also used for operating other radio apparatus. A 1-V tube is used for the rectifier. External filament voltage is available.


6 VOLT FILAMENT TRANSFORMER
25 HENRY CHOKE
GROUND TO CHASSIS
8-8 MFD.
+
+
−
1-V TUBE
H
H
P
K
2
1
3
5
4
−
12 MFD.
+
1 MFD.
SWITCH
7500 OHMS
110 VOLTS

supply firm, are mounted in the arrangement shown in the pictorial diagram. Be sure all wires are rigidly soldered and parts firmly bolted in place.

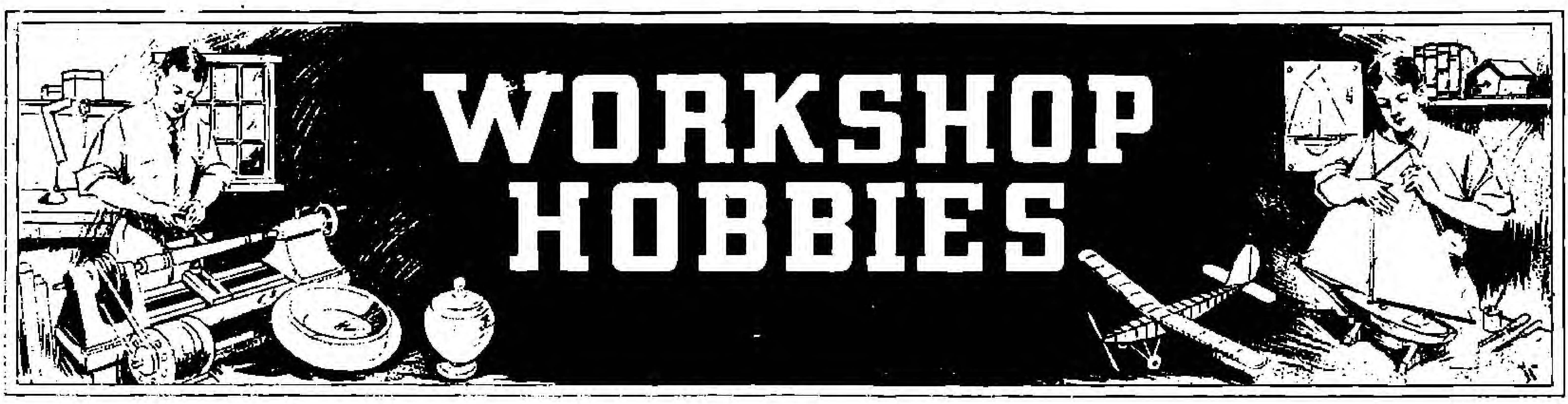
A metal type 6J7 tube is used for detection. Although regenerative the set is very easy to tune since a velvet-smooth control system is employed. By-pass condensers incorporated into the circuit eliminate all scratchy noises that are often common in this type of circuit.

Another metal tube, the 6C5, is used for amplification of the detector signals and is more than enough for good headphone volume. In many instances the set will operate a loud speaker on the more powerful stations. If moderate care is exercised in construction a neat looking and well operating receiver will result. A plug-in power connection, consisting of a 5-prong tube socket mounted in the back of the chassis eliminates the necessity of binding posts and simplifies connecting the set. Insulated terminals are provided, too, for the antenna, ground and earphone connections.

Since this set features band spread tuning the tuning dial naturally connects to a vernier tuning condenser which in this case is 30 mmf. Across it is connected a 100 mmf. which is used for approximate tuning. Once the larger condenser is adjusted near the stations it is left that way and all actual tuning done with the three-plate 30 mmf. condenser. An indicator plate on the panel provides for calibrating the approximate settings made with the 100 mmf. condenser.

A set of four plug-in coils covers the various wave bands. These may be constructed according to the coil data given in the diagrams or purchased ready for use. Although shown spaced, the coils when made should be close wound with about one-

[*Continued on page* 120]

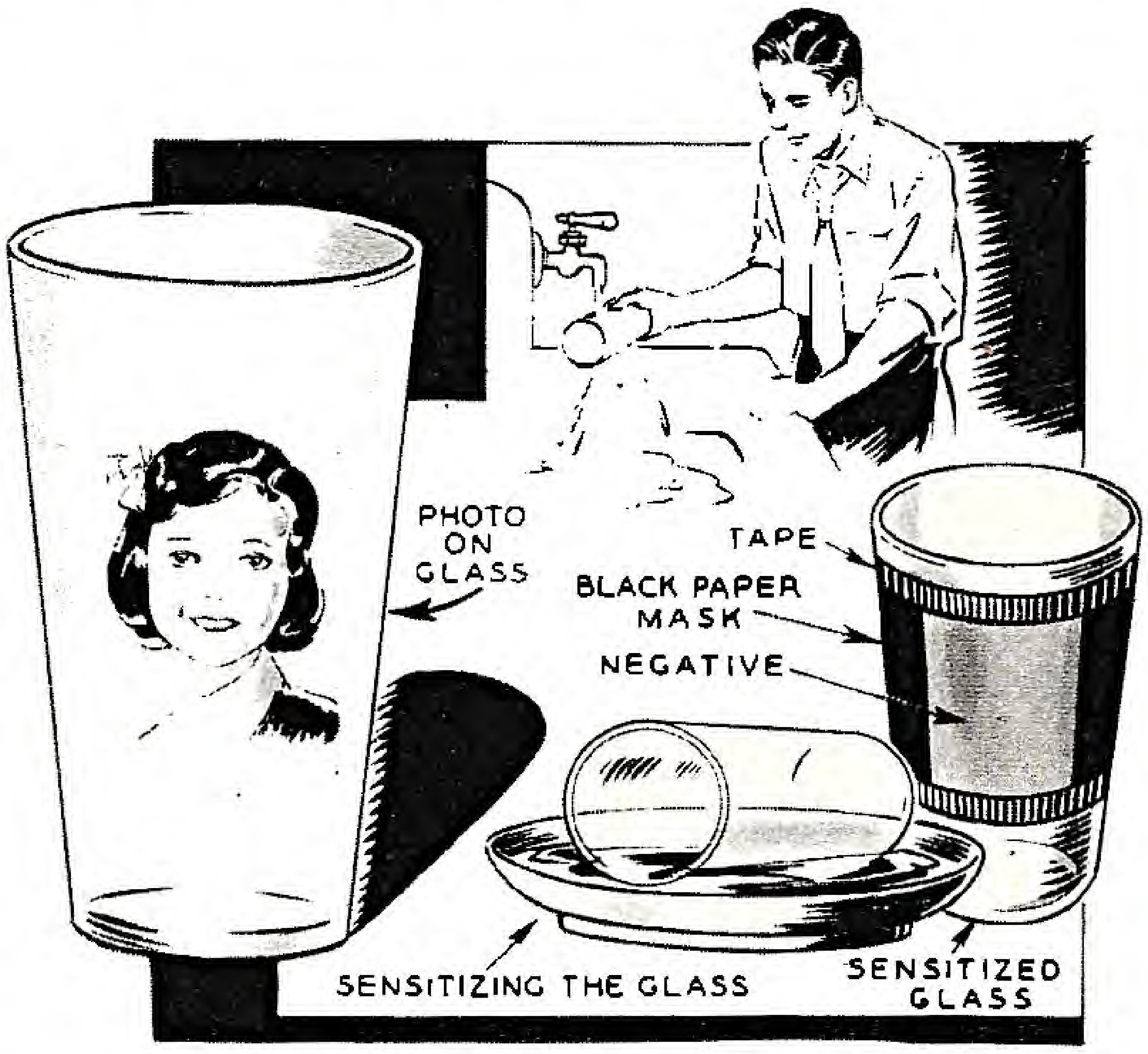


WORKSHOP HOBBIES

Favorite Photos Easily Printed On Home Glassware

GLASS bottles, vases, drinking tumblers and in fact any glass article having a smooth surface can be decorated with your favorite photograph in any color you choose. With this process the picture is actually printed on the surface of the glass.

Place 2 ounces of good liquid glue in a brown or blue glass bottle and then add sufficient food coloring to tint the glue to the color you wish the picture. Now dissolve 20 grains of ammonium or pottassium bichromate in an ounce of warm water, pour this into the glue and shake well. This work as well as applying the solution to the glass should be carried on in a darkened room. Place the bottled mixture in a saucer and roll the surface of the glass in it to secure a uniform film on the surface. Allow this to dry on the glass then proceed with the printing. First stuff a black cloth into the glass to keep out light reflections. Take the negative you wish reproduced and fasten it to the glass with tape masking out the rest of the sensitized portion. Now expose to bright sunlight for 30 to 45 minutes, remove negative and develop by washing in clear water. Pictures which have been printed on glass in this manner will withstand washing in boiling water.

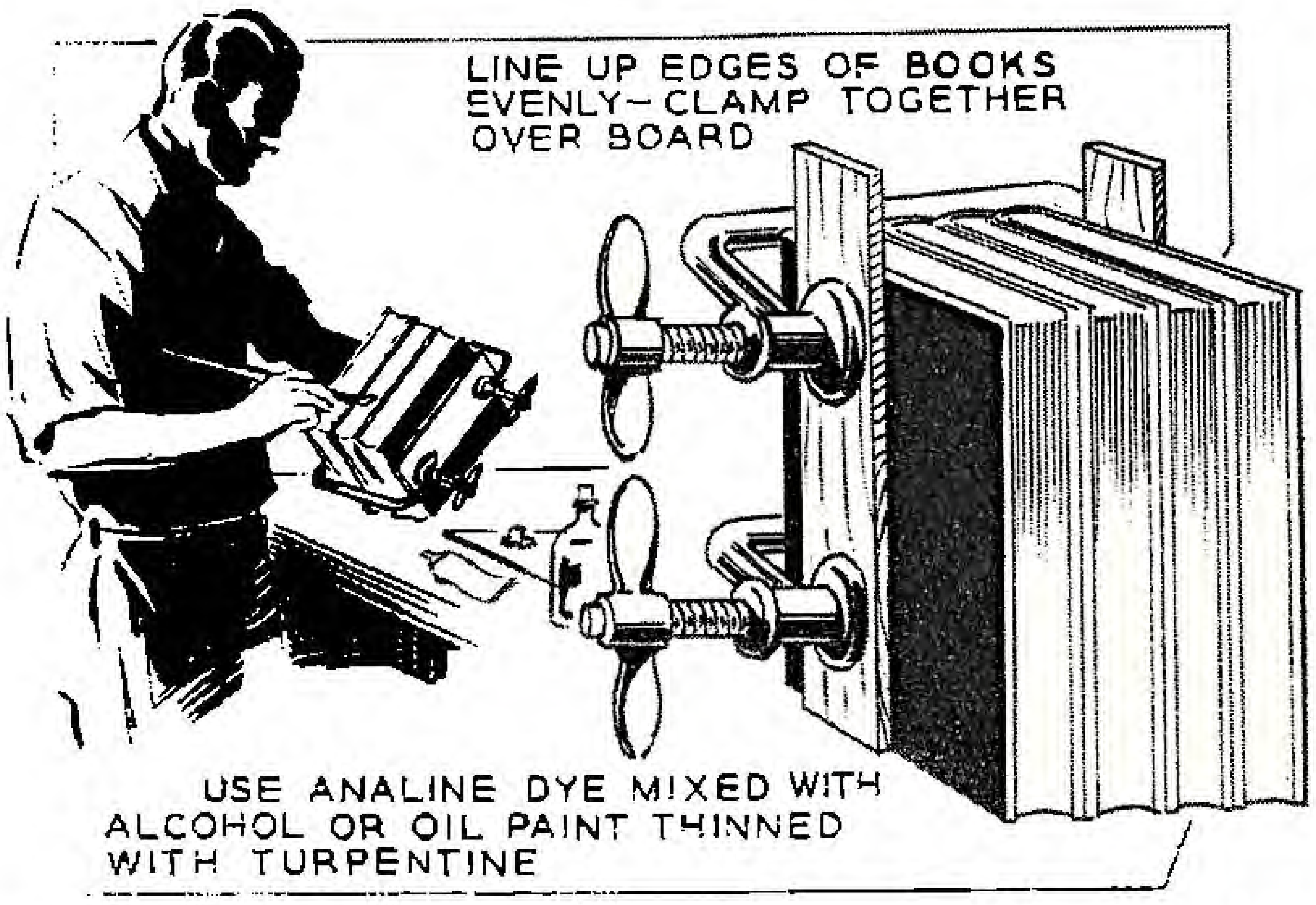


Favorite photographs are easily printed on glassware by this simple photographic process. After the sensitized solution has been applied to glass and let dry, the negative is placed over it and exposure made. Picture is developed with clear water.

Dyes Decorate Edges Of Books

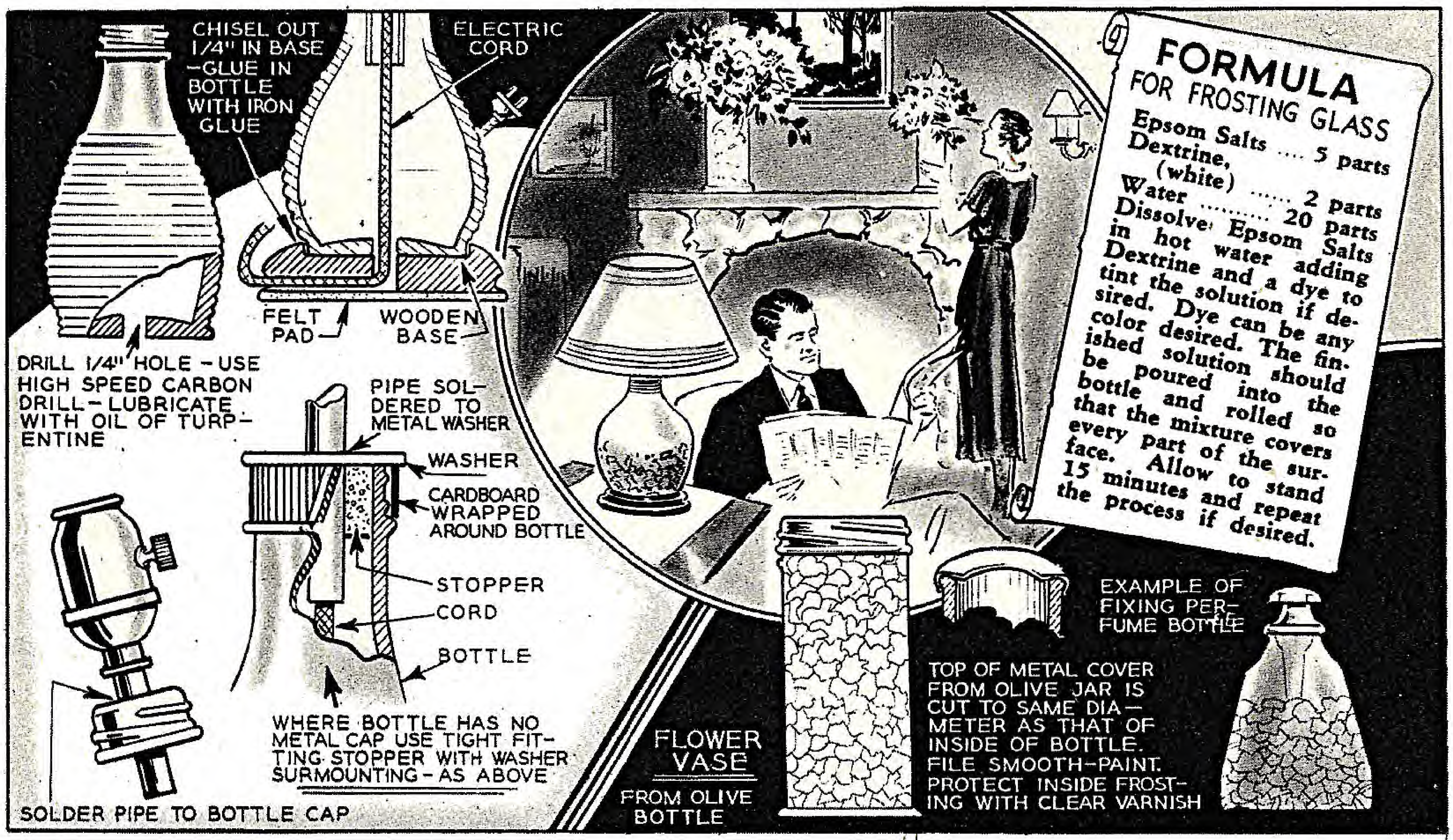
FAVORITE volumes in the home library can be greatly enhanced by decorating their edges with a marble or sprreckled design of your own choosing. For the coloring material either analine dyes, obtainable from any druggist, or oil paint thinned with turpentine may be used. Several colors can be made to harmonize by blending them into each other to provide a truly original design.

The coloring is applied with a camel's hair brush after several volumes have been placed in a gluing clamp. The clamp not only holds the pages together, but also permits each book to receive a fairly uniform design. Do not saturate the brush with too much paint or dye. Use a rather dry brush so that the coloring does not have a chance to run between the pages and spoil them. After applying one color allow it to dry for half an hour before following up with another.


LINE UP EDGES OF BOOKS EVENLY—CLAMP TOGETHER OVER BOARD
USE ANALINE DYE MIXED WITH ALCOHOL OR OIL PAINT THINNED WITH TURPENTINE

The edges of your home library books can be both beautified and identified by decorating edges with colored dyes. When completed they will have appearance of expensive volumes.

Attractive Glassware Made From Old Bottles


CHISEL OUT 1/4" IN BASE –GLUE IN BOTTLE WITH IRON GLUE
ELECTRIC CORD
FELT PAD
WOODEN BASE
DRILL 1/4" HOLE - USE HIGH SPEED CARBON DRILL - LUBRICATE WITH OIL OF TURPENTINE
PIPE SOLDERED TO METAL WASHER
WASHER
CARDBOARD WRAPPED AROUND BOTTLE
STOPPER
CORD
BOTTLE
WHERE BOTTLE HAS NO METAL CAP USE TIGHT FITTING STOPPER WITH WASHER SURMOUNTING - AS ABOVE
SOLDER PIPE TO BOTTLE CAP
FLOWER VASE
FROM OLIVE BOTTLE
TOP OF METAL COVER FROM OLIVE JAR IS CUT TO SAME DIAMETER AS THAT OF INSIDE OF BOTTLE. FILE SMOOTH-PAINT. PROTECT INSIDE FROSTING WITH CLEAR VARNISH
EXAMPLE OF FIXING PERFUME BOTTLE

FORMULA
FOR FROSTING GLASS

Epsom Salts	.... 5 parts
Dextrine, (white)	...... 2 parts
Water	.... 20 parts

Dissolve Epsom Salts in hot water adding Dextrine and a dye to tint the solution if desired. Dye can be any color desired. The finished solution should be poured into the bottle and rolled so that the mixture covers every part of the surface. Allow to stand 15 minutes and repeat the process if desired.

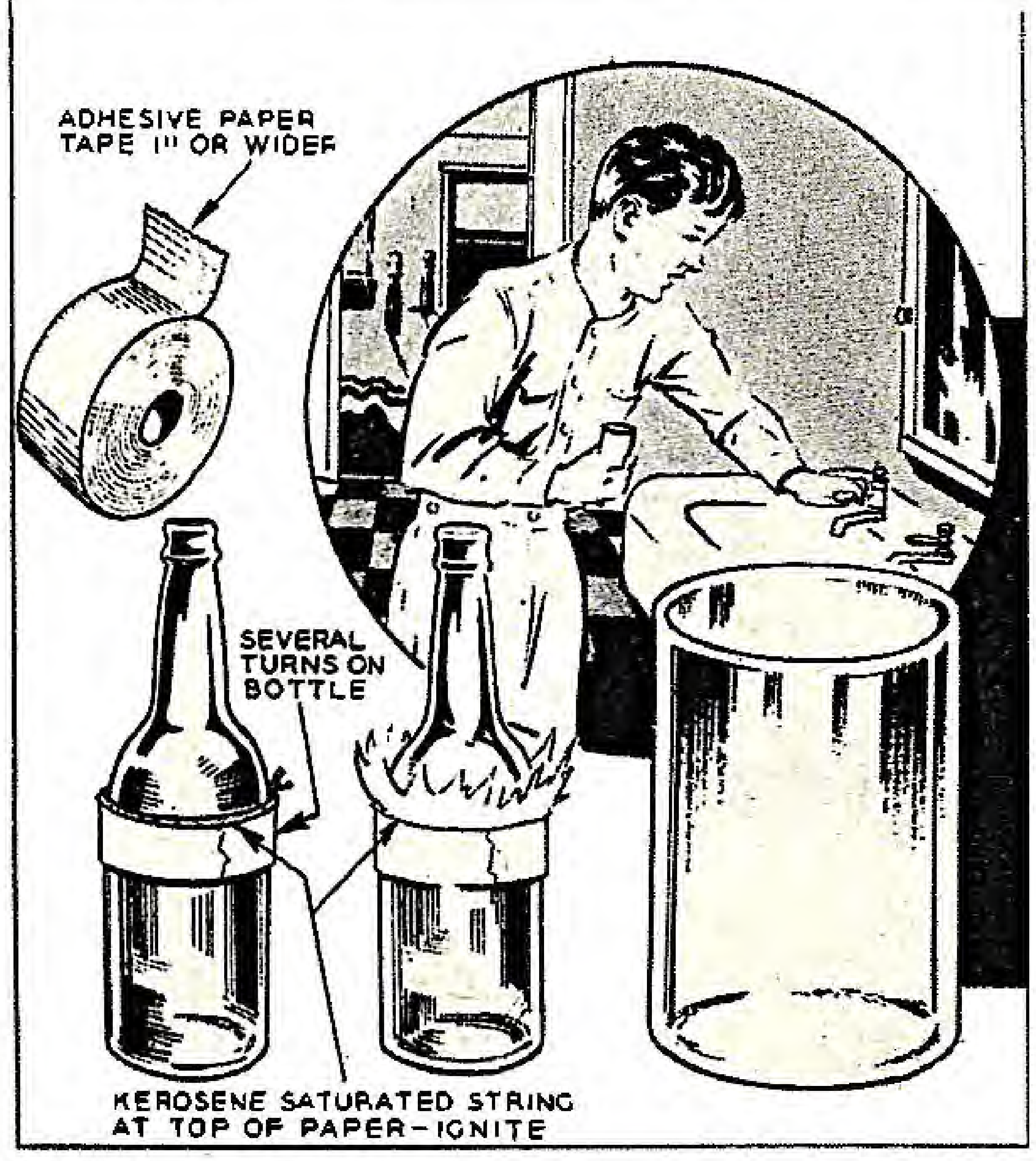
Old glass containers form these interesting pieces of glassware. In making the lamp exercise great care in drilling through the bottom. A piece of felt should be glued to the lamp base so as to prevent scratching. Apply frosting according to the formula given above until appearance satisfies.

EVERY day thousands of old jars, bottles and other glass containers are thrown away when they could be made into attractive table lamps, drinking glasses, flower vases and other objects at practically no cost. The variety of shapes is unlimited and each new container suggests a new article to be constructed from it. To add to their appearance the articles can be frosted on the inside so that when finished they will take on a manufactured look.

A vinegar jar of the type now so popular will prove ideal for the glass base of a table lamp. First frost the inside of the bottle according to the formula given in the illustrations. Before doing this the inside of the bottle should be thoroughly washed and then allowed to dry. After applying the plating solution you are ready to drill the hole in the bottom through which the fixture cord will pass. The hole is drilled with a high speed carbon drill well lubricated with turpentine. After a small hole is cut through the glass it can be enlarged to the required size with a three-cornered file. Turn a wooden base for the lamp from any hard wood and glue it in place. A standard key socket is soldered to the metal bottle closure and the lamp wired up. An inexpensive parchment lamp shade completes the project.

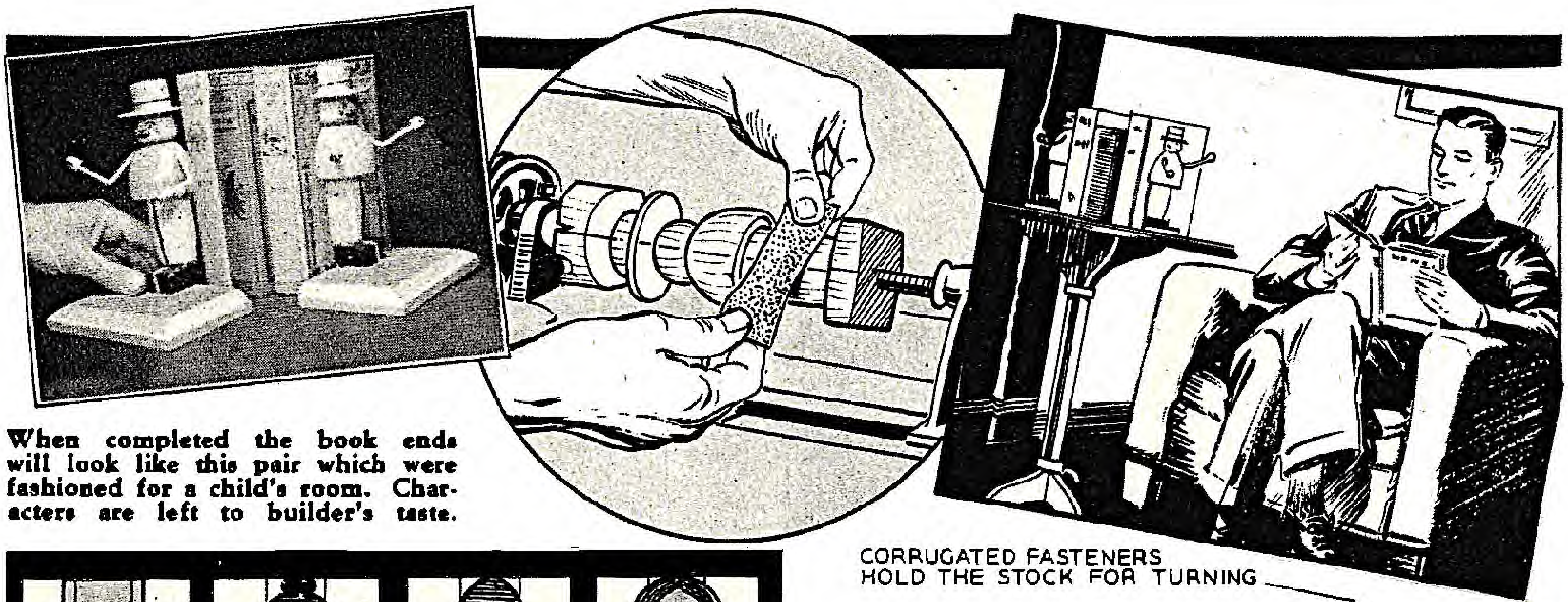
Pickle and olive bottles which have been cleaned and treated on the inside with a frosted finish like that used on the lamp will serve as neat flower vases. By cutting out the top of the bottle top and enameling in a bright color the appearance of the containers will be greatly enhanced.

Stopper bottles are excellent for making perfume bottles. It is only necessary to dip the outside of the bottle in the frosting solution and follow up with several other coats until the finish is satisfactory. A coat of clear lacquer completes the work. Beverage bottles cut off and the edges filed smooth serve well as drinking glasses.

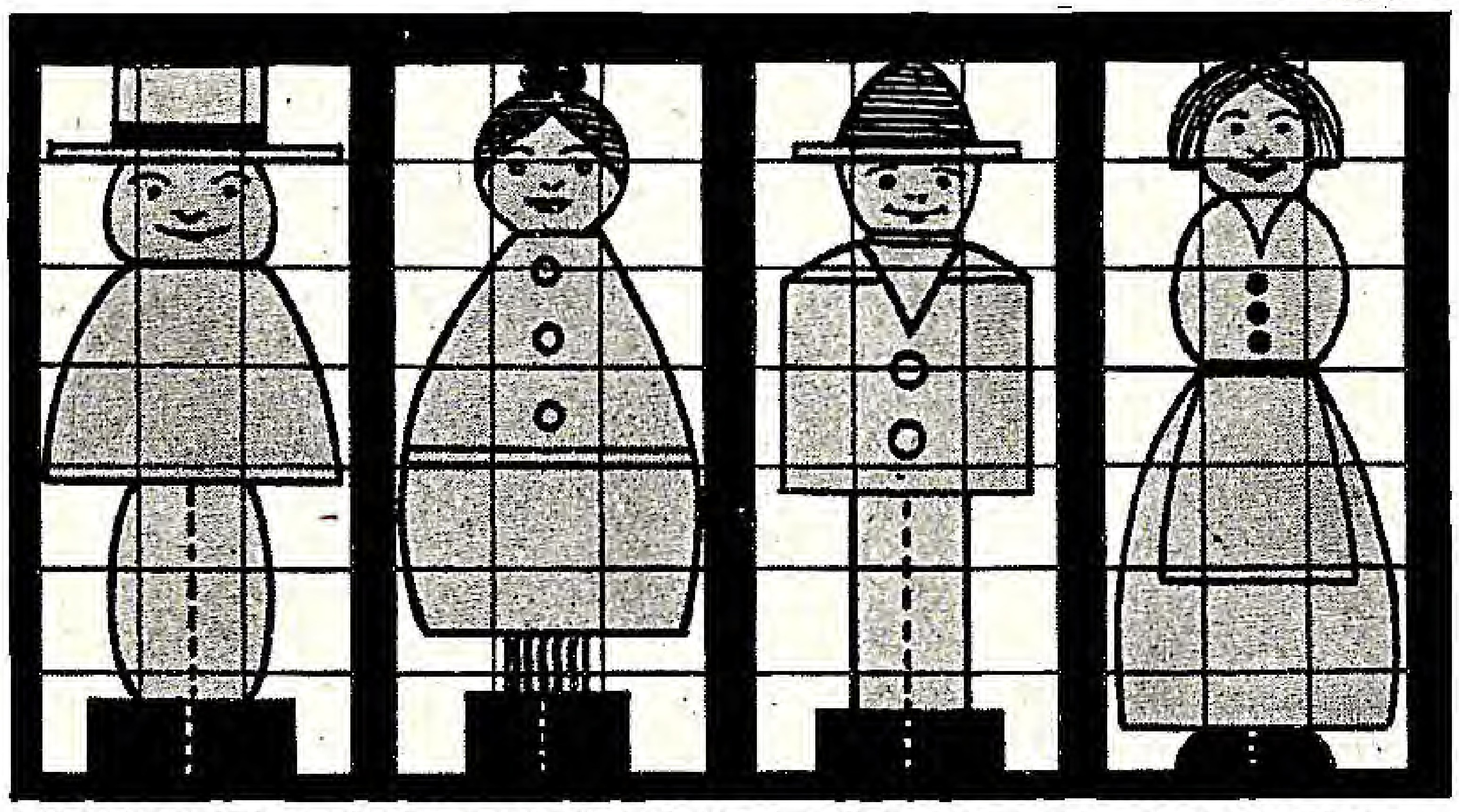

ADHESIVE PAPER TAPE 1" OR WIDER
SEVERAL TURNS ON BOTTLE
KEROSENE SATURATED STRING AT TOP OF PAPER-IGNITE

Beverage bottles are cut to size quickly by winding paper tape around bottle, placing kerosene soaked string on top, igniting, plunging in water after allowing glass to get hot.

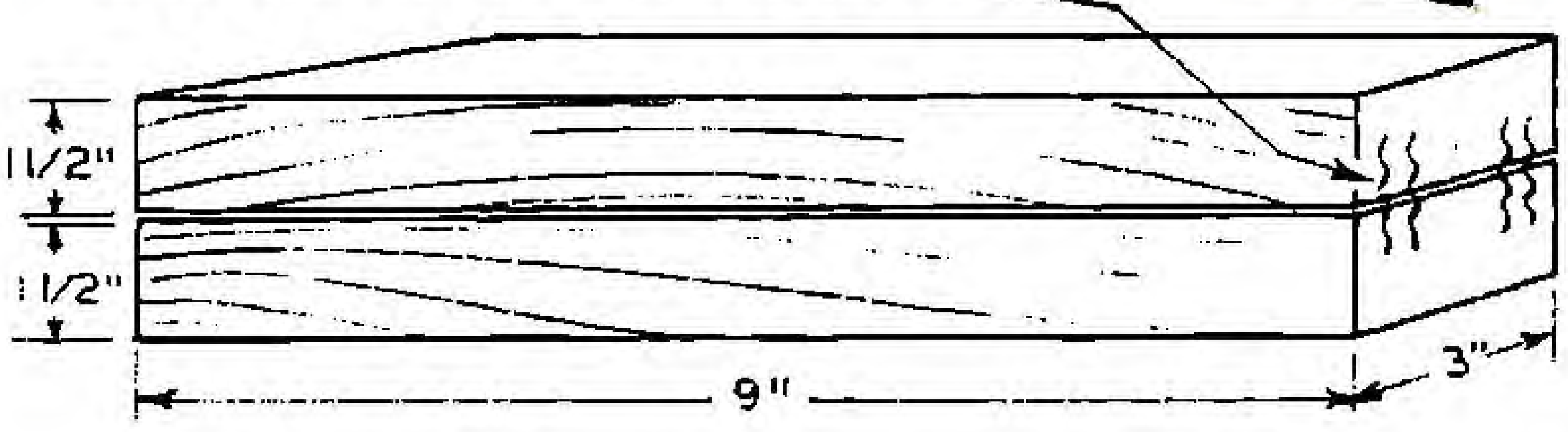
Novelty Book Ends Turned On Lathe



When completed the book ends will look like this pair which were fashioned for a child's room. Characters are left to builder's taste.



SUGGESTED MODELS FOR BOOK ENDS CUT TO 1" SQUARES



These comic character book ends are turned in a single lathe operation by fastening two pieces of wood together, as shown, with corrugated fasteners. The characters are turned according to the suggested patterns shown at left. Then they are sanded down, enameled and mounted.

COMICAL characters whose strong backs support a row of books on a library table may be quickly turned on a wood lathe. Any number of characters may be originated by turning the shape of the hat, face, body, legs and shoes down with a skew chisel.

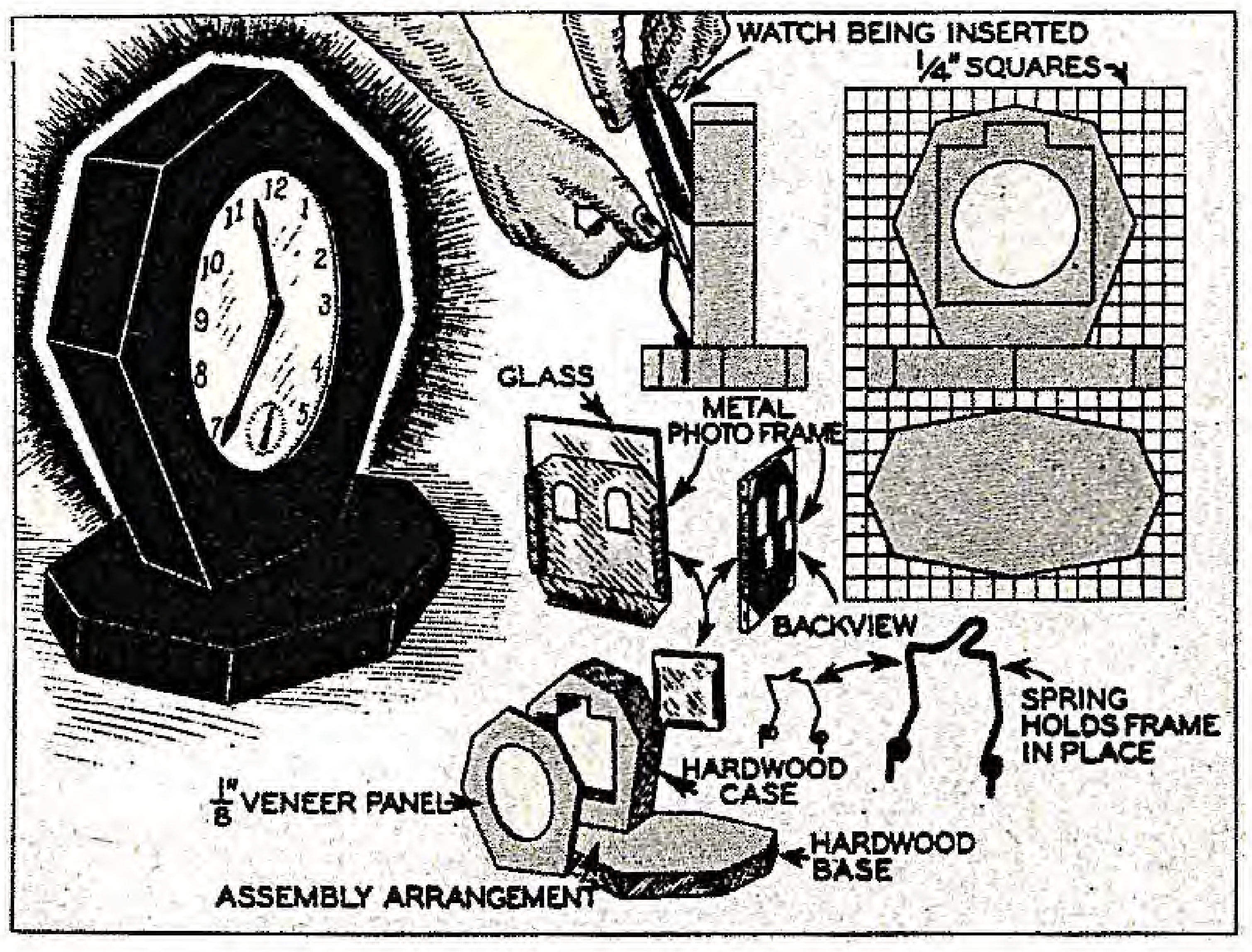
In making the book ends first cut two pieces of medium soft stock 9″ by 1½″ by 3″ and fasten them together at each end with corrugated fasteners producing a single block 6″ thick. The block is then centered in the lathe and the characters turned out according to the pattern designs in accompanying diagrams.

After shaping the figures, sand the turning while the work is still in the lathe so as to produce a smooth finish on the surface. After the turning has been removed from the lathe, cut away the waste from the hat, shape the feet to represent shoes and you have two identical comic figures.

Paint the characters with bright colored enamel, using pink for the face and any other color combination you desire for the clothing. The eyes, ears, nose and mouth are marked with black. The completed figures are mounted to sturdy wooden bases and pipe cleaners inserted in the sides to serve as arms. Small hands are last carved and attached to the ends of the pipe cleaners.

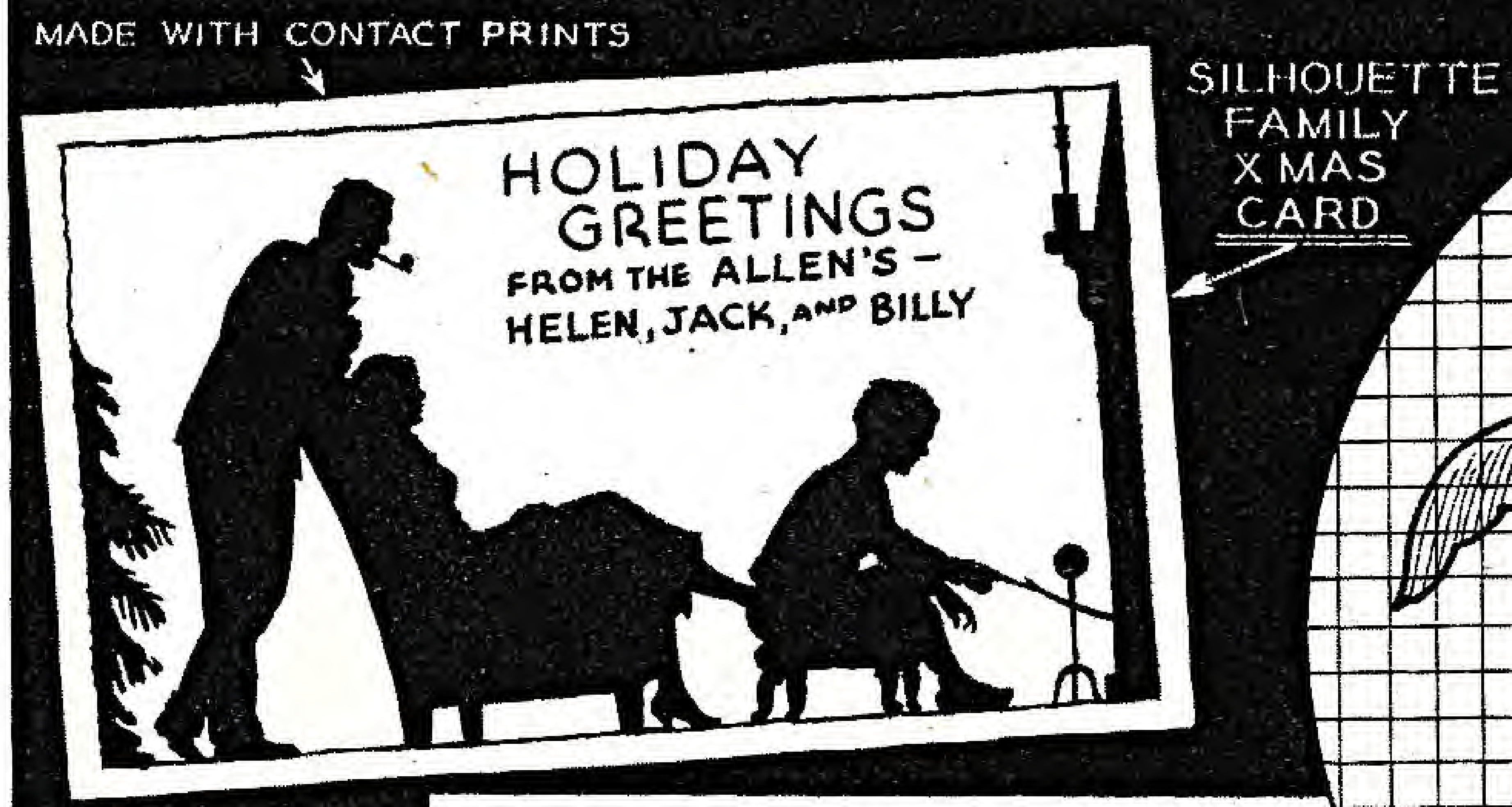
Traveler's Clock Case Hides Photo

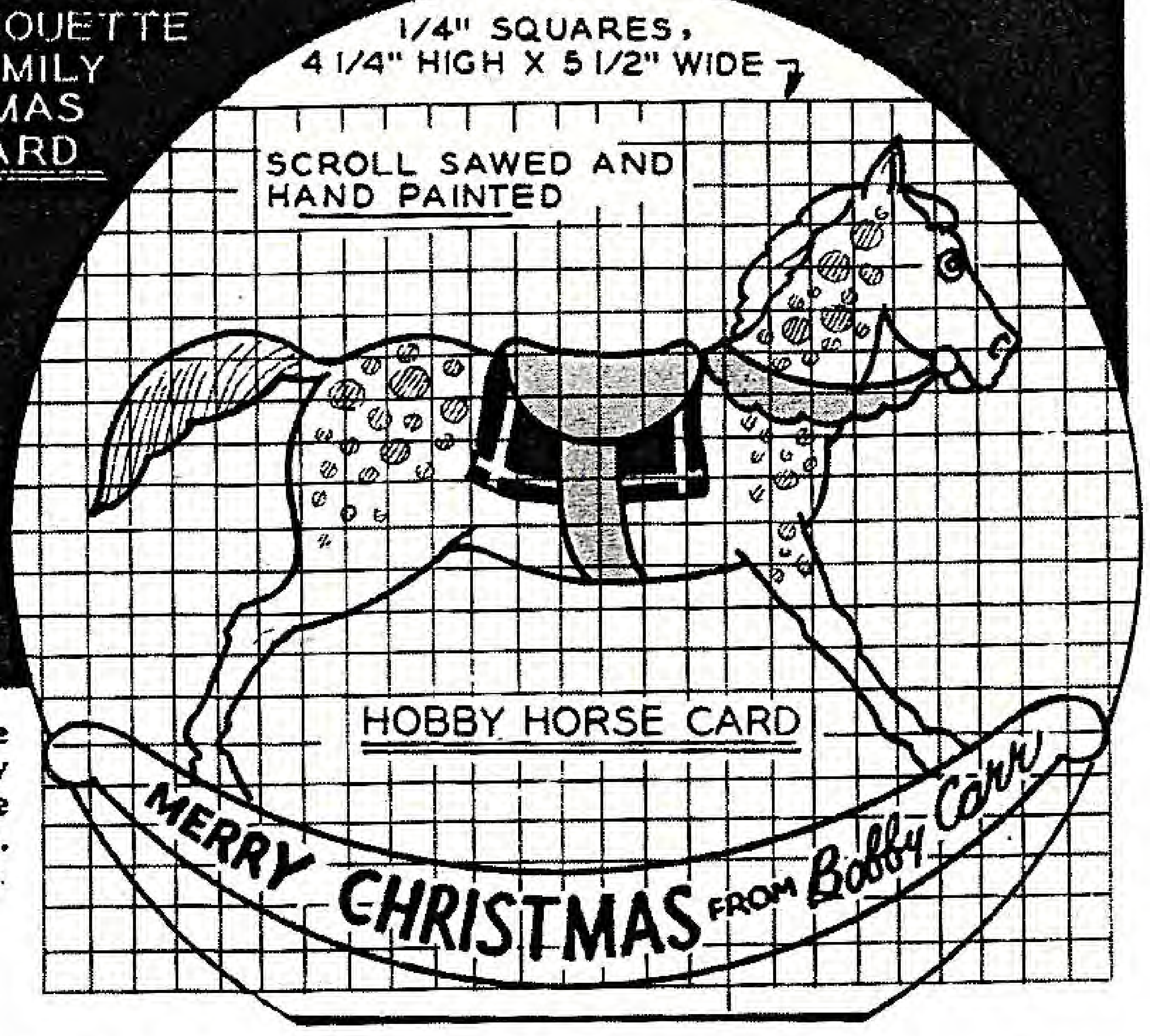
A NOVEL clock case for inserting the pocket watch when traveling offers a new use for odd pieces of wood lying about the workshop. Provided with a spring clip back to which a photo frame is attached the case automatically becomes a picture holder when the watch is removed. The case is cut to the approximate shape as shown and assembled after which it is finished a natural color or enameled. The photo clip holder in spring is installed last in back of frame.



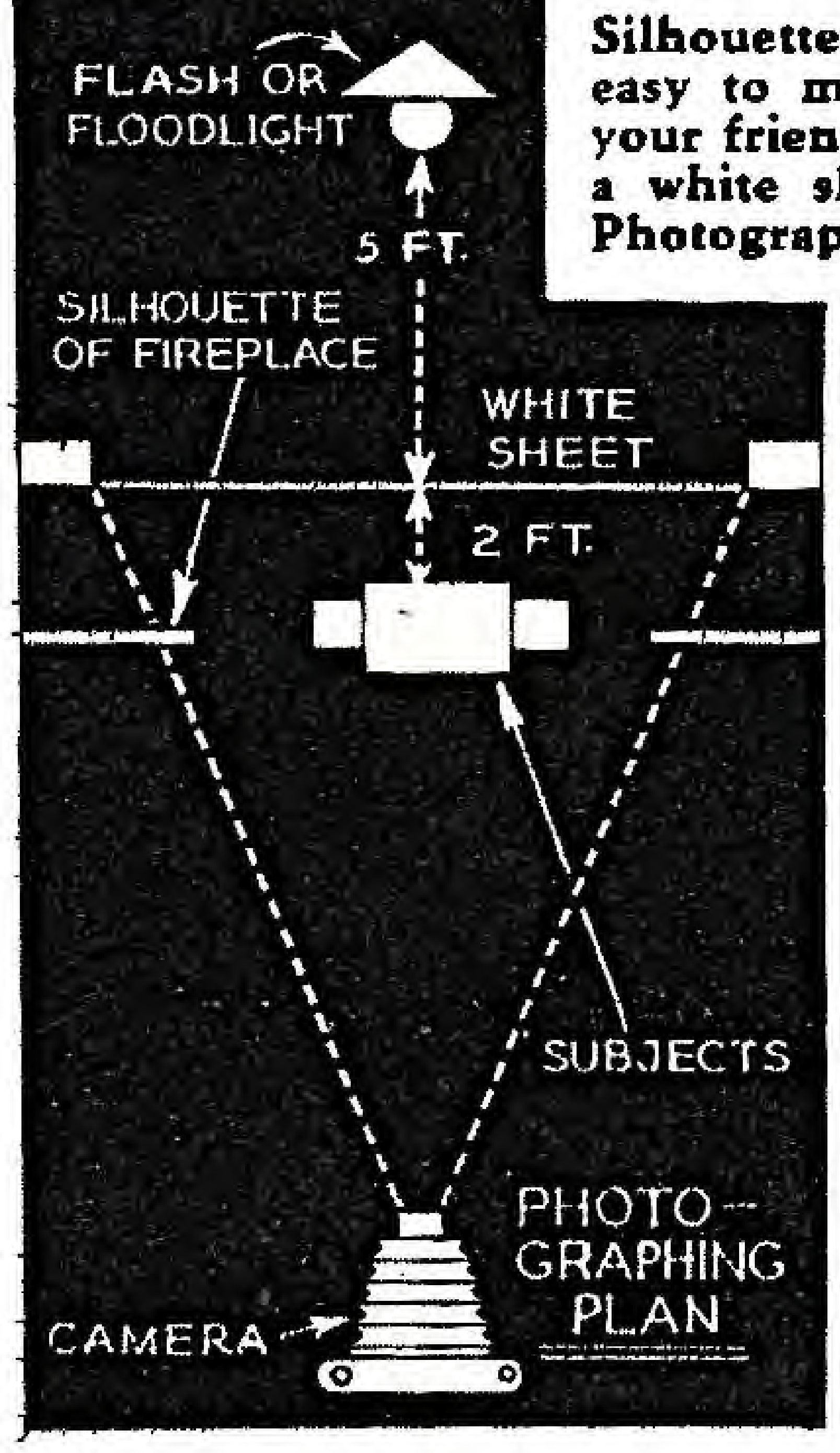
Cut from pieces of scrap wood this attractive clock case combines a picture frame in the back for your favorite photo.

Original Christmas Greeting


MADE WITH CONTACT PRINTS
HOLIDAY GREETINGS
FROM THE ALLEN'S – HELEN, JACK, AND BILLY
SILHOUETTE FAMILY X MAS CARD


1/4" SQUARES, 4 1/4" HIGH X 5 1/2" WIDE
SCROLL SAWED AND HAND PAINTED
HOBBY HORSE CARD
MERRY CHRISTMAS FROM Bobby Carr

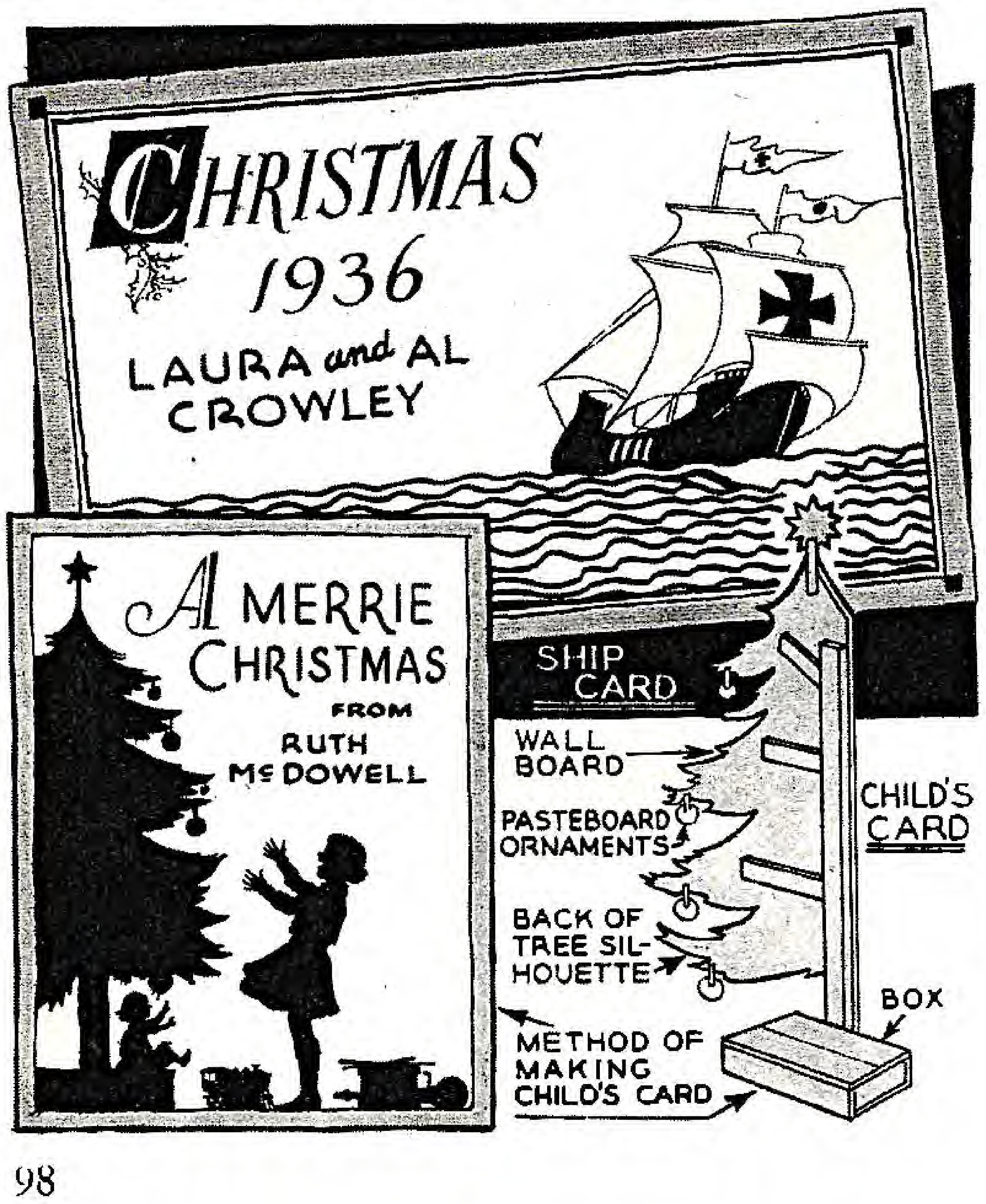
Silhouette greeting cards like this one are easy to make and will be appreciated by your friends. The pictures are taken before a white sheet illuminated from the rear. Photographic arrangement appears at left.


FLASH OR FLOODLIGHT
5 FT.
SILHOUETTE OF FIREPLACE
WHITE SHEET
2 FT.
SUBJECTS
PHOTOGRAPHING PLAN
CAMERA

Billy
steps out
to wish you
Merry Christmas
for
the KOSTRAS
of
COS COB

This rocking Hobby Horse card will appeal especially to children. The horse is traced on bristol board from this pattern inked and then colored in wax crayon or water colors.

Greetings such as the one pictured at the right are even more interesting than the silhouette type. After mounting picture and adding the necessary atmosphere and lettering it is copied and sepia or dull white prints made. Cards may be colored too.


CHRISTMAS
1936
LAURA and AL CROWLEY
A MERRIE CHRISTMAS
FROM
RUTH McDOWELL
SHIP CARD
WALL BOARD
PASTEBOARD ORNAMENTS
BACK OF TREE SILHOUETTE
CHILD'S CARD
BOX
METHOD OF MAKING CHILD'S CARD

GREETING cards have always been an expression of friendliness during the Christmas season and can be made more so when of your own original design. Such cards not only provide a more lasting remembrance, but also provide their senders with a lot of pleasure in making them.

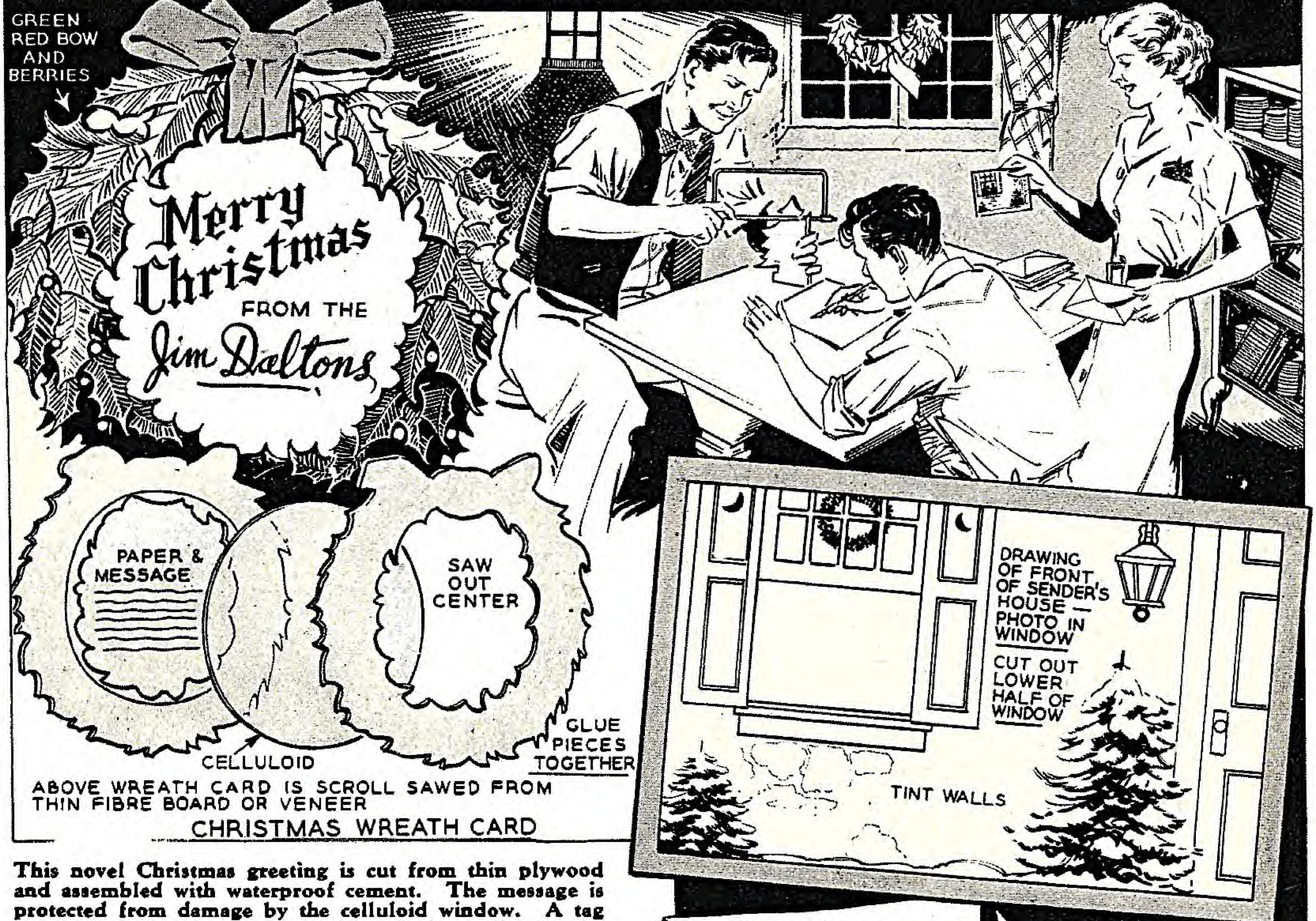
Of all original Christmas greeting cards the photographic type is probably the most popular although in recent years the novelty card has been chosen by many. Both types are shown in the accompanying illustrations so that you can make your own choice.

Although requiring slightly more preparation the photographic card is by far the simplest to make if a quantity is desired. Both the picture and silhouette cards are very attractive and not at all difficult to make. Silhouettes are photographed before a white cloth screen behind which a floodlight or flash lamp is placed. The subjects are arranged before the screen and the picture snapped.

Another negative containing the greeting is placed over the silhouette and the two printed at the same time so that when developed the photo card contains both the picture and message. To make the greeting negative first letter the words on white paper using India ink. Photograph this in the usual manner so that the resulting negative is black except where the letters appear.

In making plain greeting photographs it is

Cards Everyone Can Make


GREEN RED BOW AND BERRIES
Merry Christmas
FROM THE
Jim Daltons
PAPER & MESSAGE
SAW OUT CENTER
CELLULOID
GLUE PIECES TOGETHER
ABOVE WREATH CARD IS SCROLL SAWED FROM THIN FIBRE BOARD OR VENEER
CHRISTMAS WREATH CARD
DRAWING OF FRONT OF SENDER'S HOUSE — PHOTO IN WINDOW
CUT OUT LOWER HALF OF WINDOW
TINT WALLS

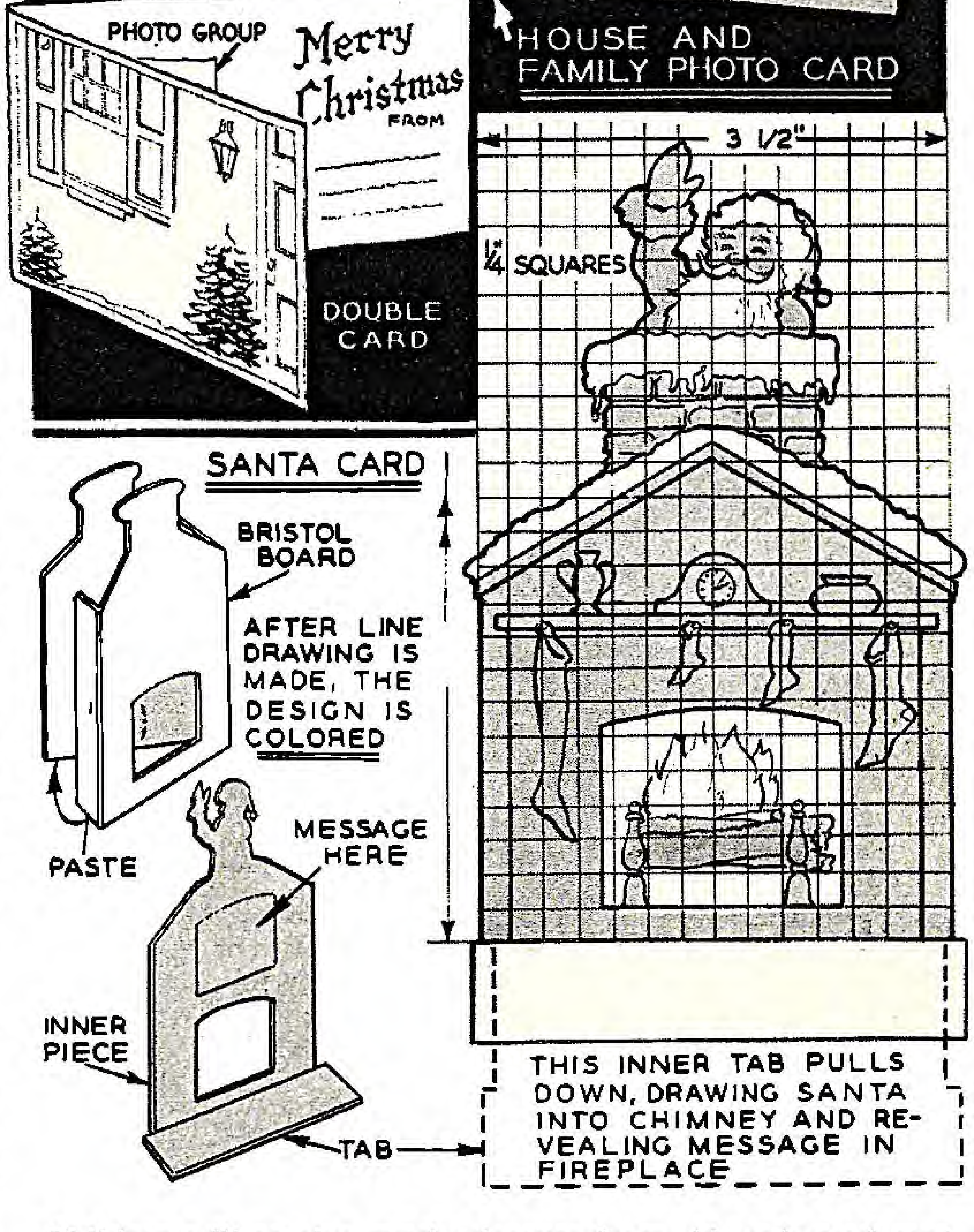
This novel Christmas greeting is cut from thin plywood and assembled with waterproof cement. The message is protected from damage by the celluloid window. A tag attached permits it to be sent through the mail. A plywood Christmas tree can be made from the same material.

often possible to write the message directly on the negative with black masking varnish so that both message and picture print at the same time. Where a more elaborate card is desired it may be photographed from several other pictures arranged in an attractive layout. A little experimenting will result in numerous ideas suitable for greeting card use.

Novelty cards are interesting pastime for children of all ages and their styles range from simple crayon colored cards to the more elaborate plywood cut-outs. For the simple cards a good grade of bristol board may be used. The picture on the card can be traced from a magazine illustration then crayoned-in. The older child can letter in the greeting in ink or water colors instead of using crayons with a neater card resulting.

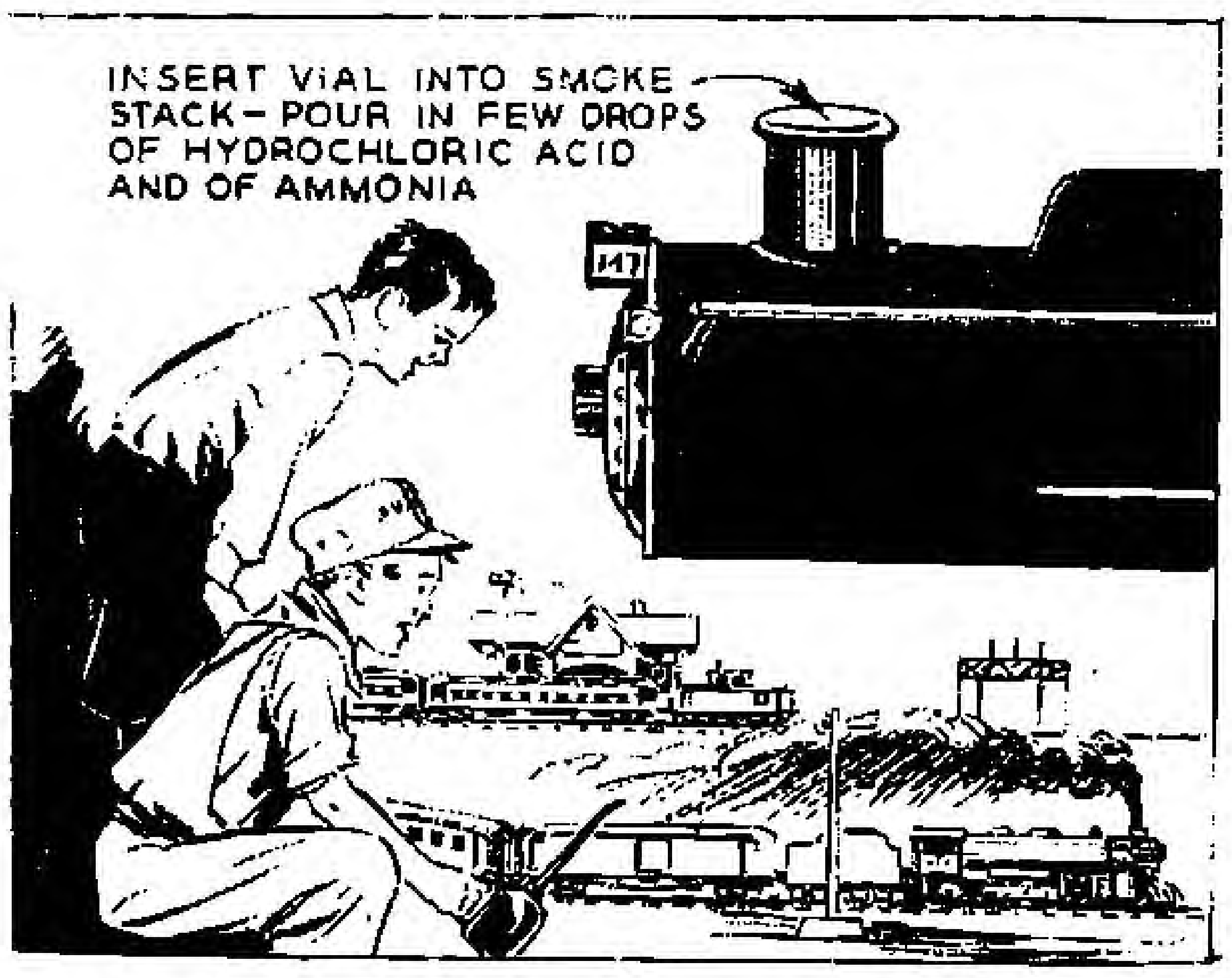
If you have a number of small family group photographs they can be attractively mounted in a greeting folder provided with a cut-out flap. The front of the card has the design of a window painted on it with the lower half cut out. Inside is mounted the

[Continued on page 126]


HOUSE AND FAMILY PHOTO CARD
PHOTO GROUP
Merry Christmas
FROM
DOUBLE CARD
3 1/2"
¼ SQUARES
SANTA CARD
BRISTOL BOARD
AFTER LINE DRAWING IS MADE, THE DESIGN IS COLORED
PASTE
MESSAGE HERE
INNER PIECE
TAB
THIS INNER TAB PULLS DOWN, DRAWING SANTA INTO CHIMNEY AND REVEALING MESSAGE IN FIREPLACE

Children will receive much pleasure from this animated card. When the tab at bottom of the card is pulled Santa slides down the chimney and a greeting appears in the fireplace opening

NEW KINKS For MODEL Railroaders

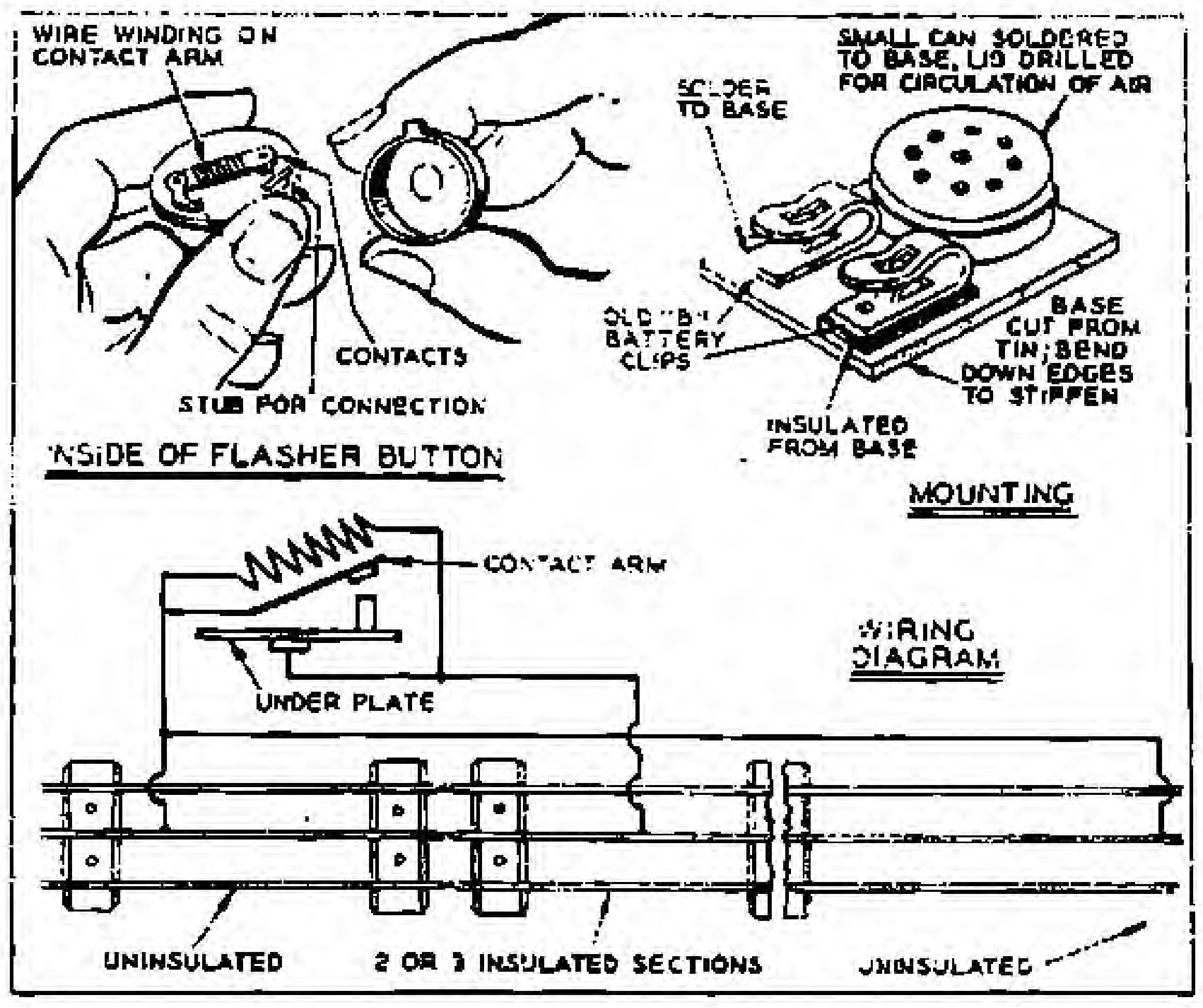

INSERT VIAL INTO SMOKE STACK–POUR IN FEW DROPS OF HYDROCHLORIC ACID AND OF AMMONIA
147

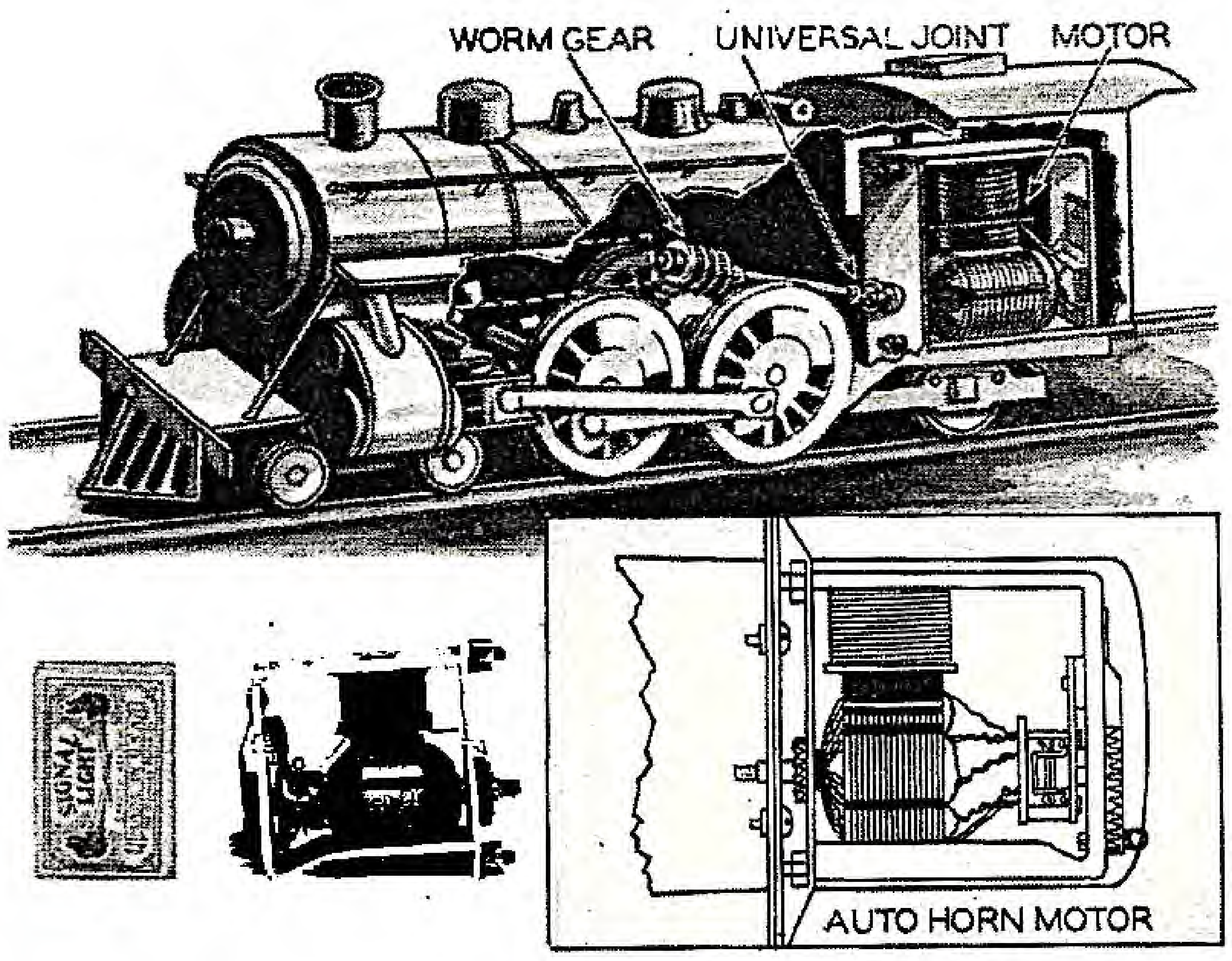
Chemical Provides Smoke For Trains

WITH many of the model trains featuring both automatic whistles and bells the only thing lacking to make the miniature locomotive truly authentic is smoke. Your model locomotives can be provided with this unique feature by employing a simple stunt of chemistry. Insert a short glass vial in the stack of the locomotive or a piece of test tube. Then pour in a few drops of hydrochloric acid and ammonia.—J. A. Marotta, Cleveland, O.

Flasher Button Makes Automatic Station Stop

A SMALL flasher button such as is used to make Christmas tree lights blink makes a clever automatic station stop for miniature railway systems. Insulate a section of the third rail where station is located then attach leads for connecting to flasher. Remove all but about one-eighth of the winding. Hook up the coil in the manner described in diagram. If train runs too slow remove more turns until the proper speed is obtained.—John Story, Oklahoma City, Okla.


WIRE WINDING ON CONTACT ARM
CONTACTS
STUB FOR CONNECTION
INSIDE OF FLASHER BUTTON
SOLDER TO BASE
SMALL CAN SOLDERED TO BASE, LID DRILLED FOR CIRCULATION OF AIR
OLD "B" BATTERY CLIPS
BASE CUT FROM TIN; BEND DOWN EDGES TO STIFFEN
INSULATED FROM BASE
MOUNTING
CONTACT ARM
UNDER PLATE
WIRING DIAGRAM
UNINSULATED
2 OR 3 INSULATED SECTIONS
UNINSULATED


WORM GEAR
UNIVERSAL JOINT
MOTOR
AUTO HORN MOTOR

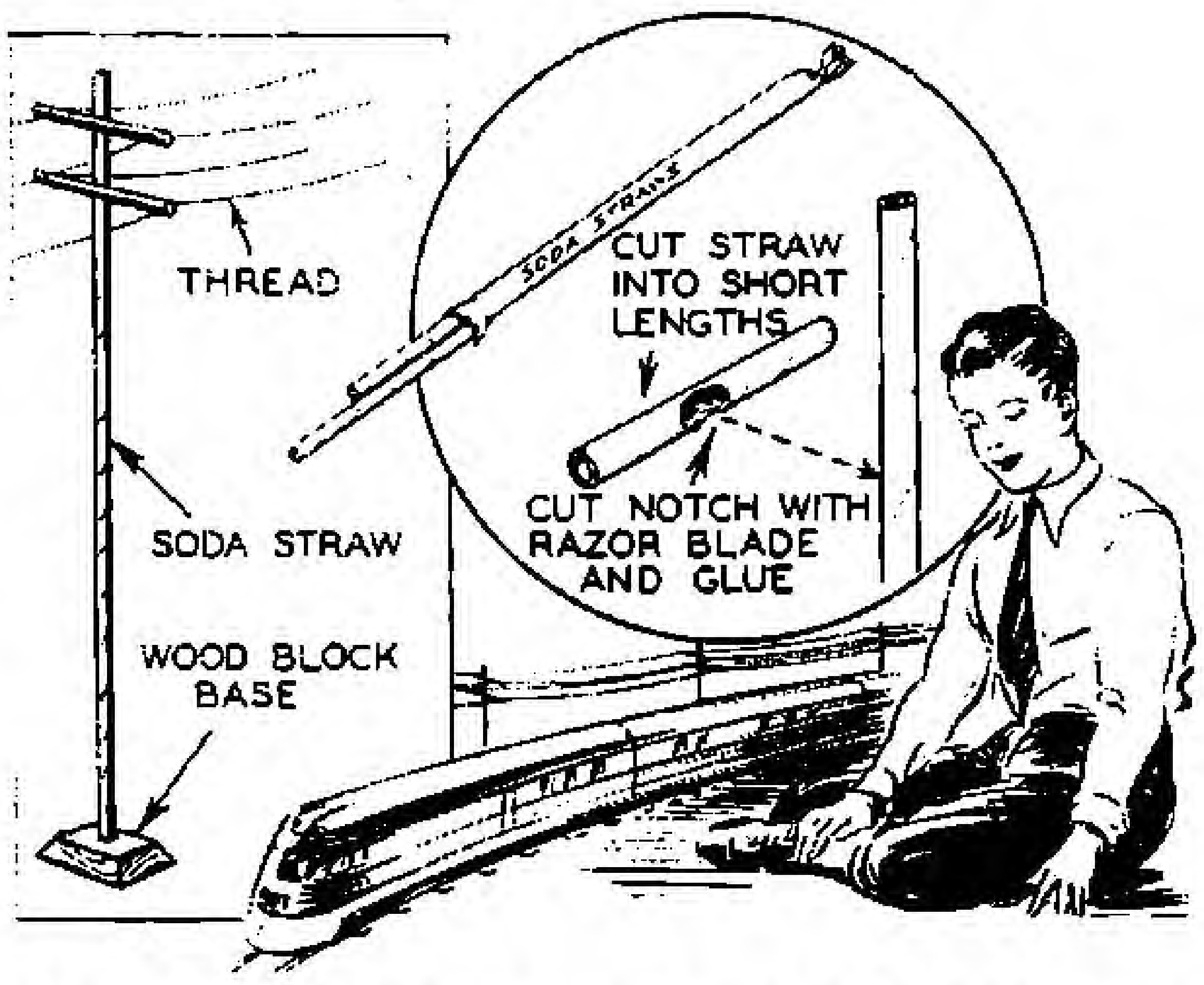
Auto Horn Motor Powers Engine

MOTORS for driving miniature locomotives can be salvaged from horns removed from junked autos. Since some horns are of the vibrator type be sure that the one you select is motor driven. Remove the motor and clean it well. After it is in perfect running order mount it in the cab of the 00 gauge locomotive. A universal joint transmits the power to the worm gear drive.

Since the size of these motors varies, the actual constructional details must be left to the ingenuity of the builder.—R. W. Burgess, Loupurex, Pa.

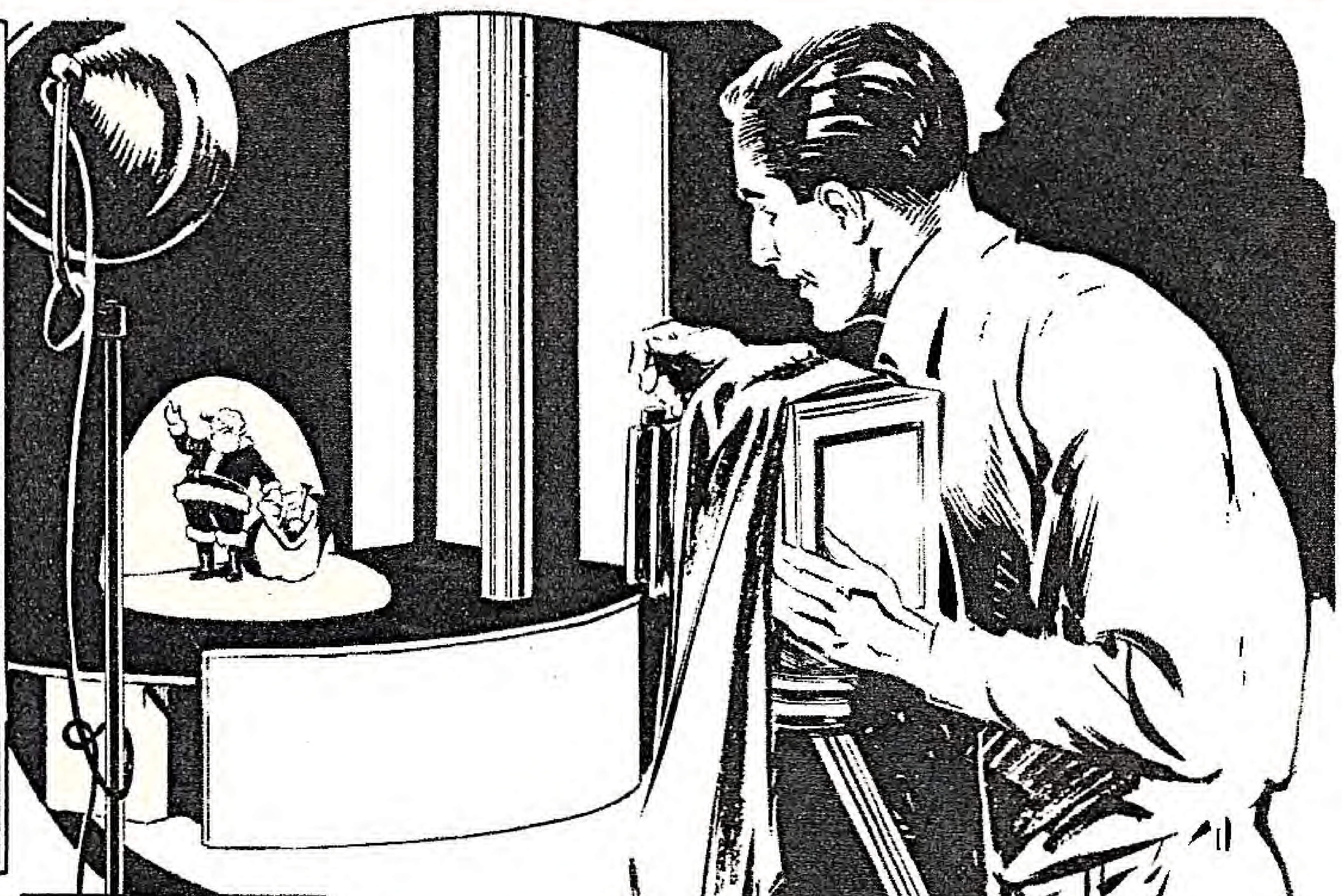
Soda Straws Make Neat Telegraph Poles

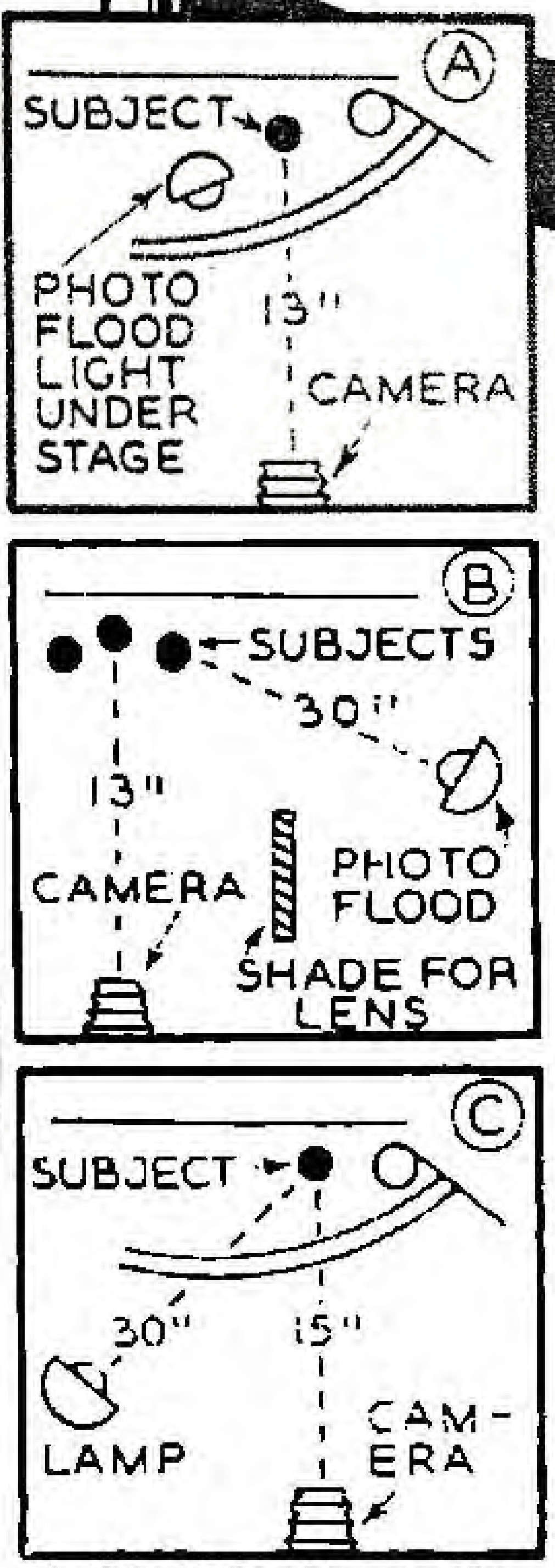
TELEGRAPH poles for 00 gauge miniature railway systems being quite difficult to obtain can be constructed at little or no cost from inexpensive soda straws. Notch the straws to provide crossarms and cement or glue these in place with airplane ambroid. Cut small bases for the poles, drill a $\frac{3}{16}$-inch hole in their centers and attach the poles. After the cement has thoroughly dried paint the entire assembly with dark brown or gray water color paint. For wires, thread such as used by tailors is used.—Elmer McKinney, Honey Brook, Pa.


THREAD
SODA STRAW
WOOD BLOCK BASE
SODA STRAWS
CUT STRAW INTO SHORT LENGTHS
CUT NOTCH WITH RAZOR BLADE AND GLUE

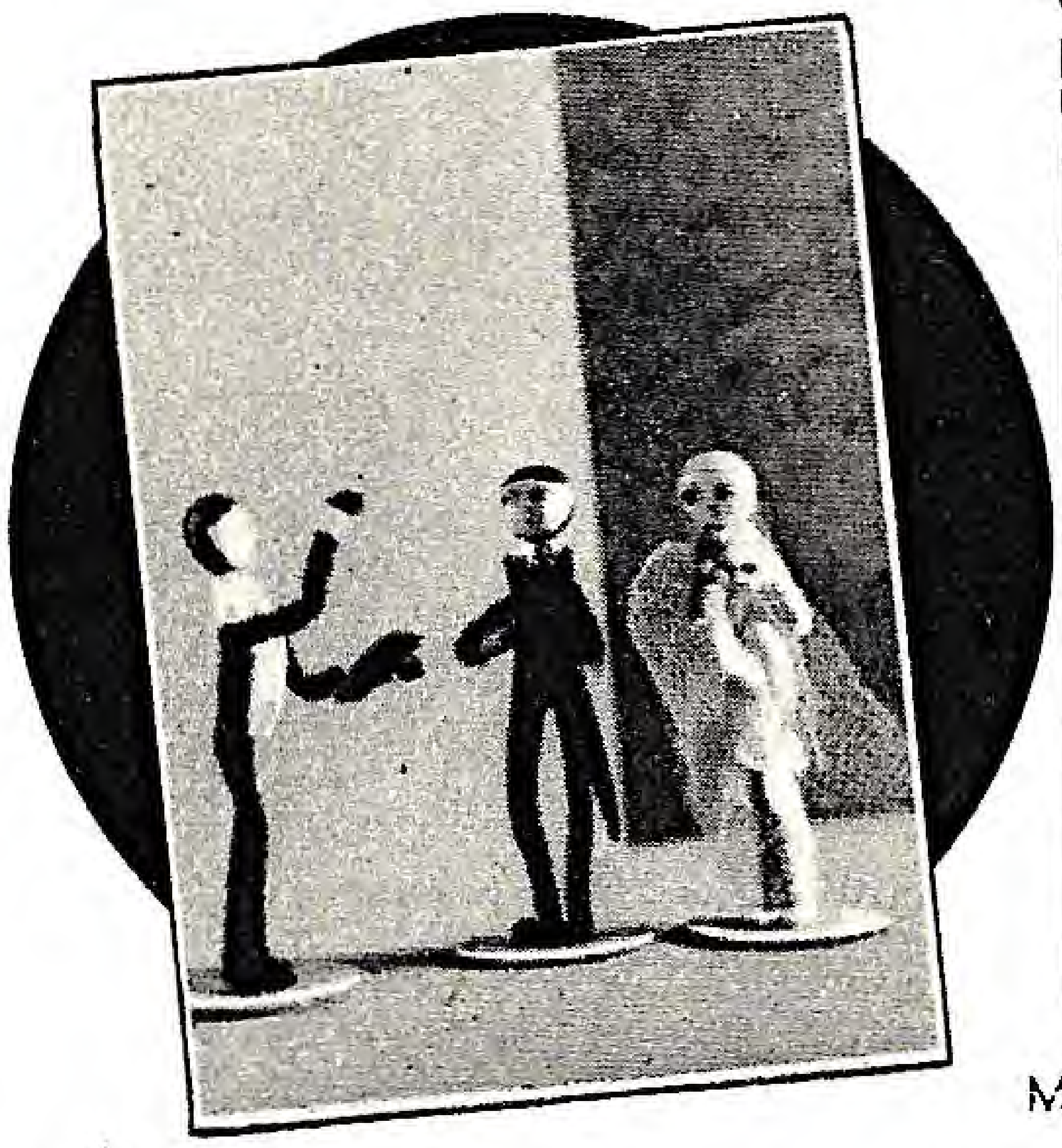
Making Novel Table-Top PHOTOGRAPHS

Pipe cleaner characters like this gay little dancer are interesting subjects to photograph. One photo flood bulb and exposure of one second with lens at f.8 will give very clear reproduction.




A
SUBJECT
PHOTO FLOOD LIGHT UNDER STAGE
13"
CAMERA
B
SUBJECTS
30"
13"
CAMERA
PHOTO FLOOD
SHADE FOR LENS
C
SUBJECT
30"
15"
LAMP
CAM-ERA

LIGHTING AND MODEL PLACEMENT



Posed in lifelike manner these figures of a couple about to be wed will provide plenty of amusement when shown to friends. One photo flood bulb with one second exposure at f.8 made it.

by RUSSELL E. OAKES

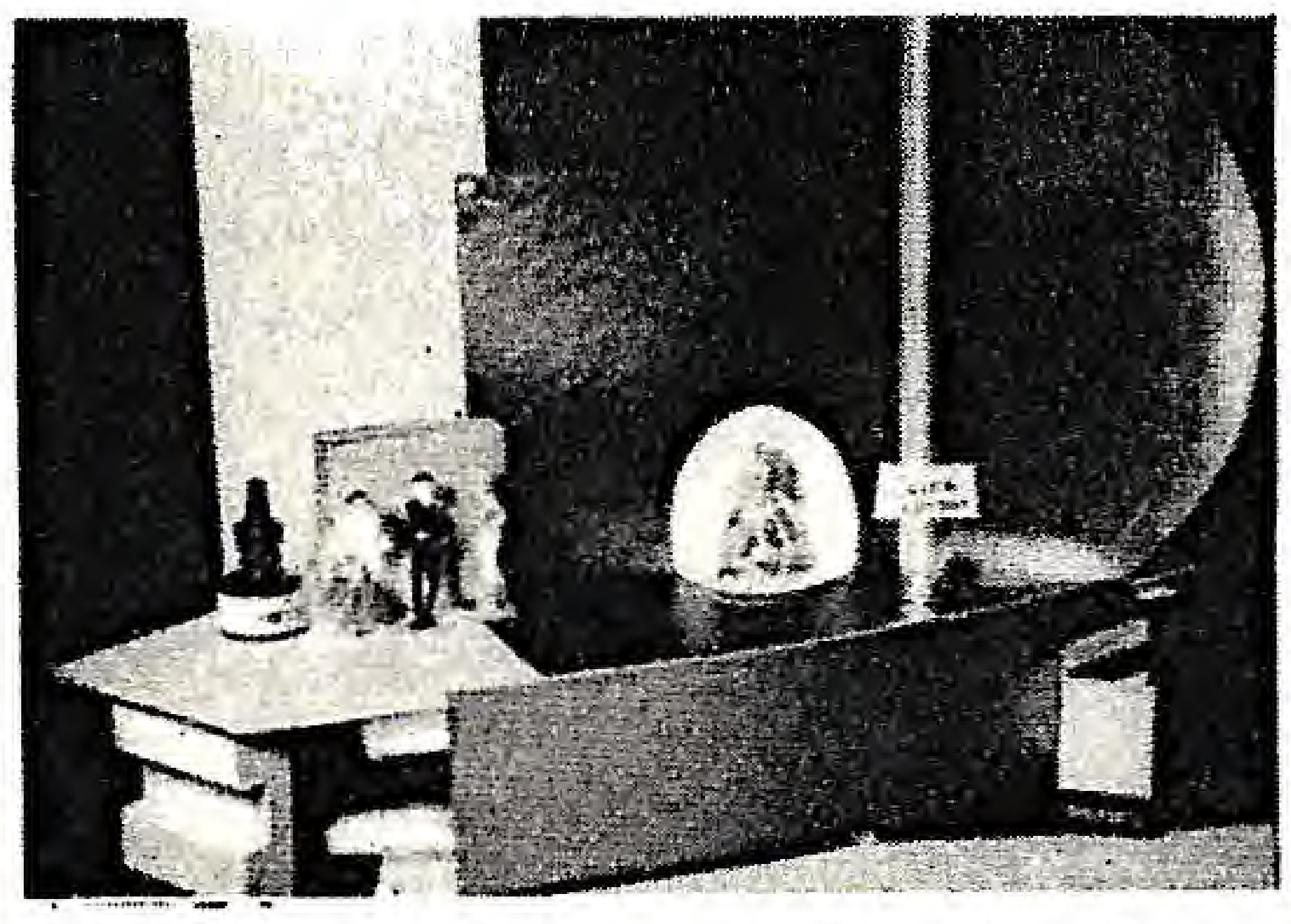
IF YOU have taxed your ingenuity in making new and different night shots of friends and members of your family, table-top shots like those shown here offer a new field for artistic expression.

You can give your ingenuity full sway in this branch of your picture-making hobby. All you need as accessories are a few sheets of paper, cardboard and some small pieces of wallboard; a few wooden blocks; and a couple photo flood lamps. You may either model your subjects or get them at the dime store at very small cost. The little figures in the accompanying pictures are ten-cent items ordinarily used as favors in table decoration.

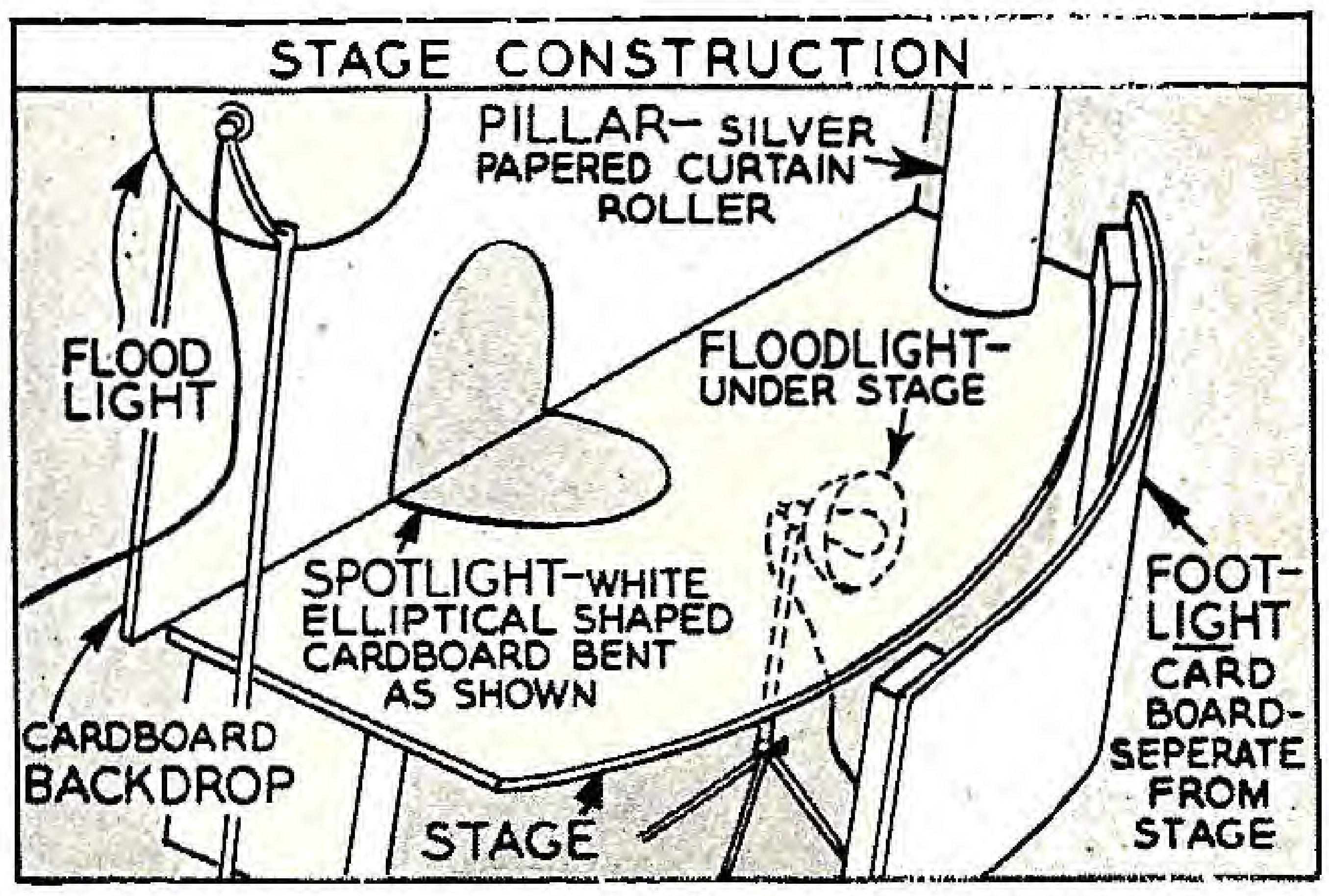
The nice feature about this type of work is that it opens up an intensely interesting avenue of picture making to owners of cameras with the slower lenses. You can

[*Continued on page* 126]

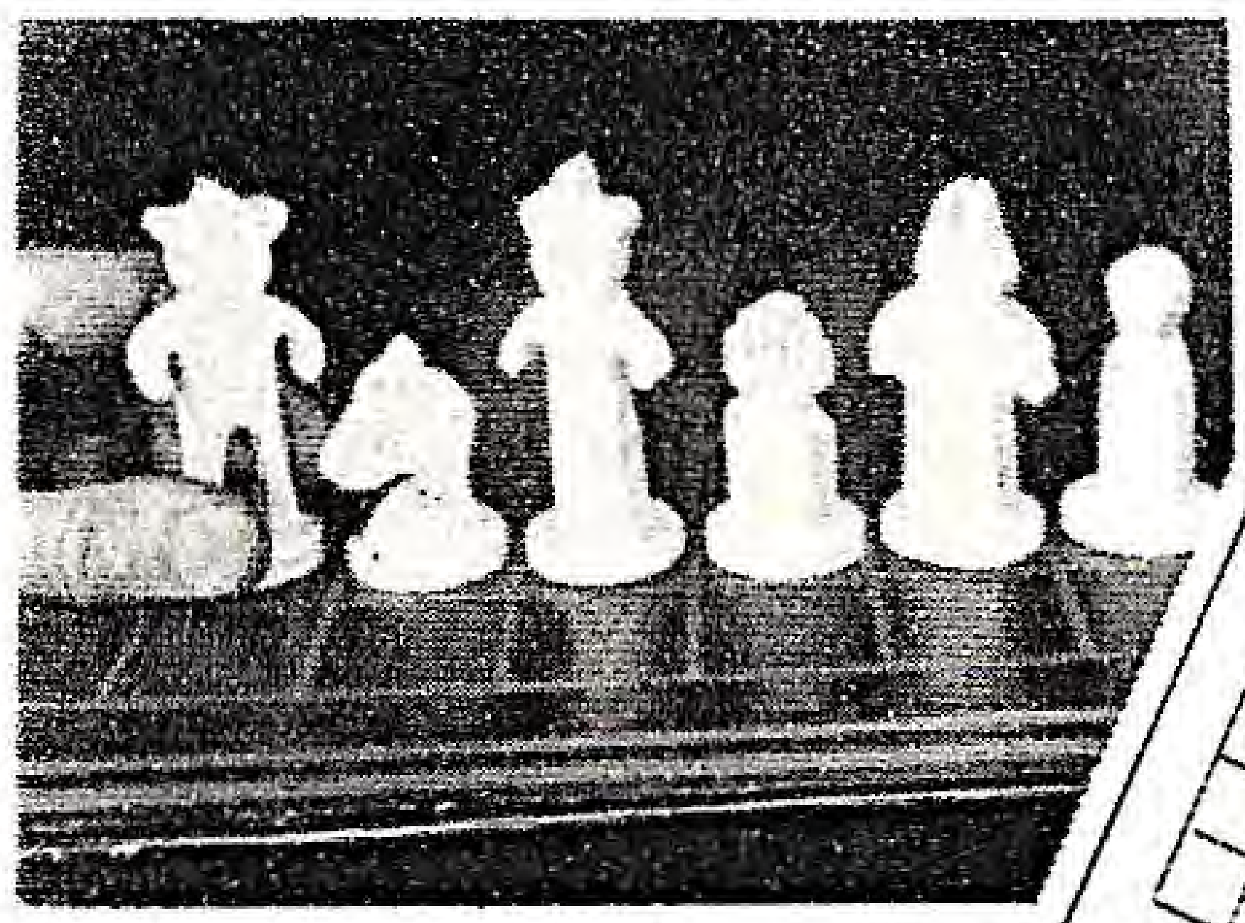
ROVING COWBOY



This is the stage on which the pipe cleaner characters were photographed. Note their size in comparison to a bottle of ink. For best effects adjust them to lifelike positions.


STAGE CONSTRUCTION
PILLAR— SILVER PAPERED CURTAIN ROLLER
FLOOD LIGHT
FLOODLIGHT— UNDER STAGE
SPOTLIGHT—WHITE ELLIPTICAL SHAPED CARDBOARD BENT AS SHOWN
FOOT-LIGHT
CARD BOARD-SEPERATE FROM STAGE
CARDBOARD BACKDROP
STAGE

Simple GIFT Projects



Above—Set of men as used in playing chess, made as described here.

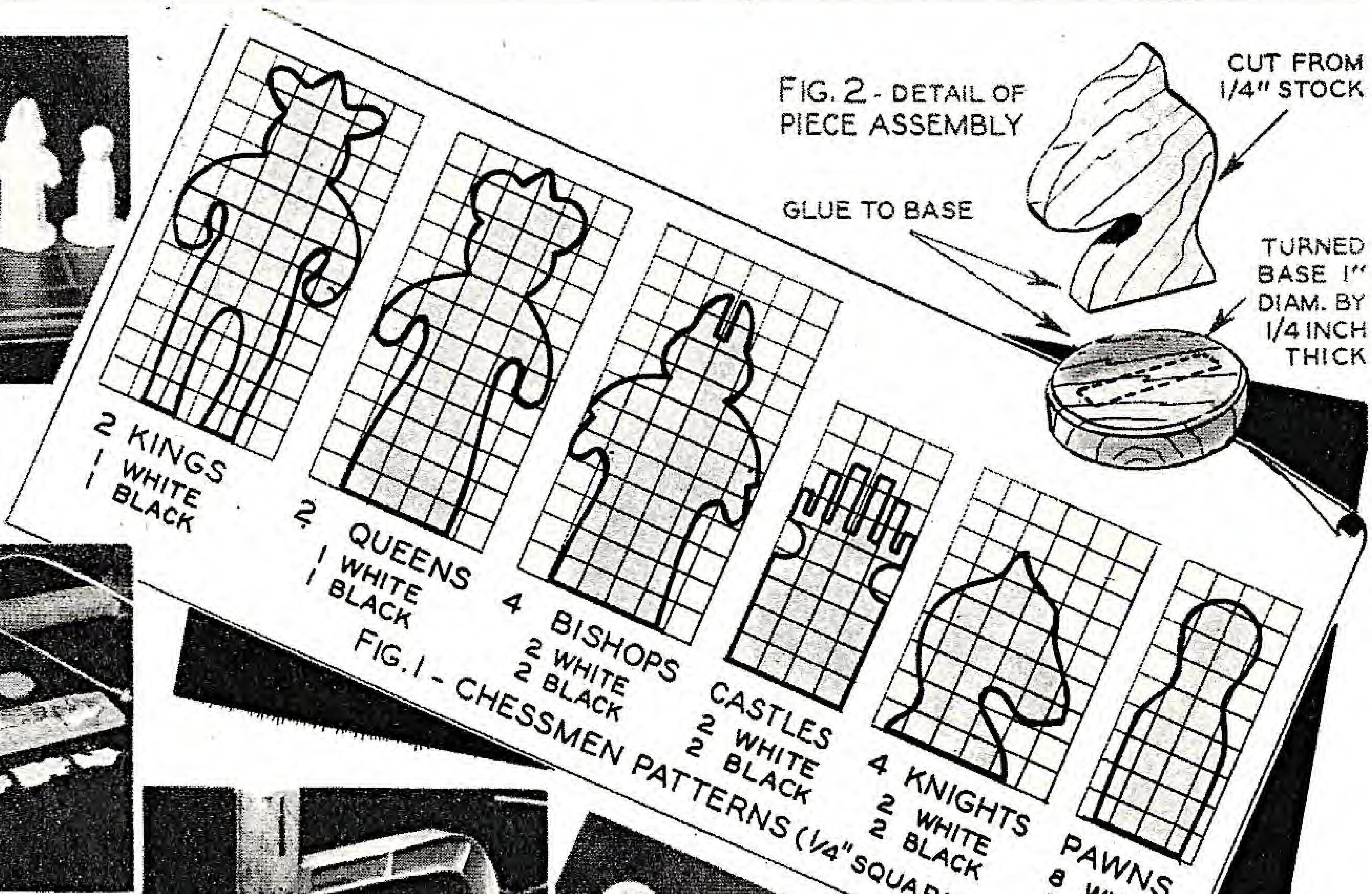
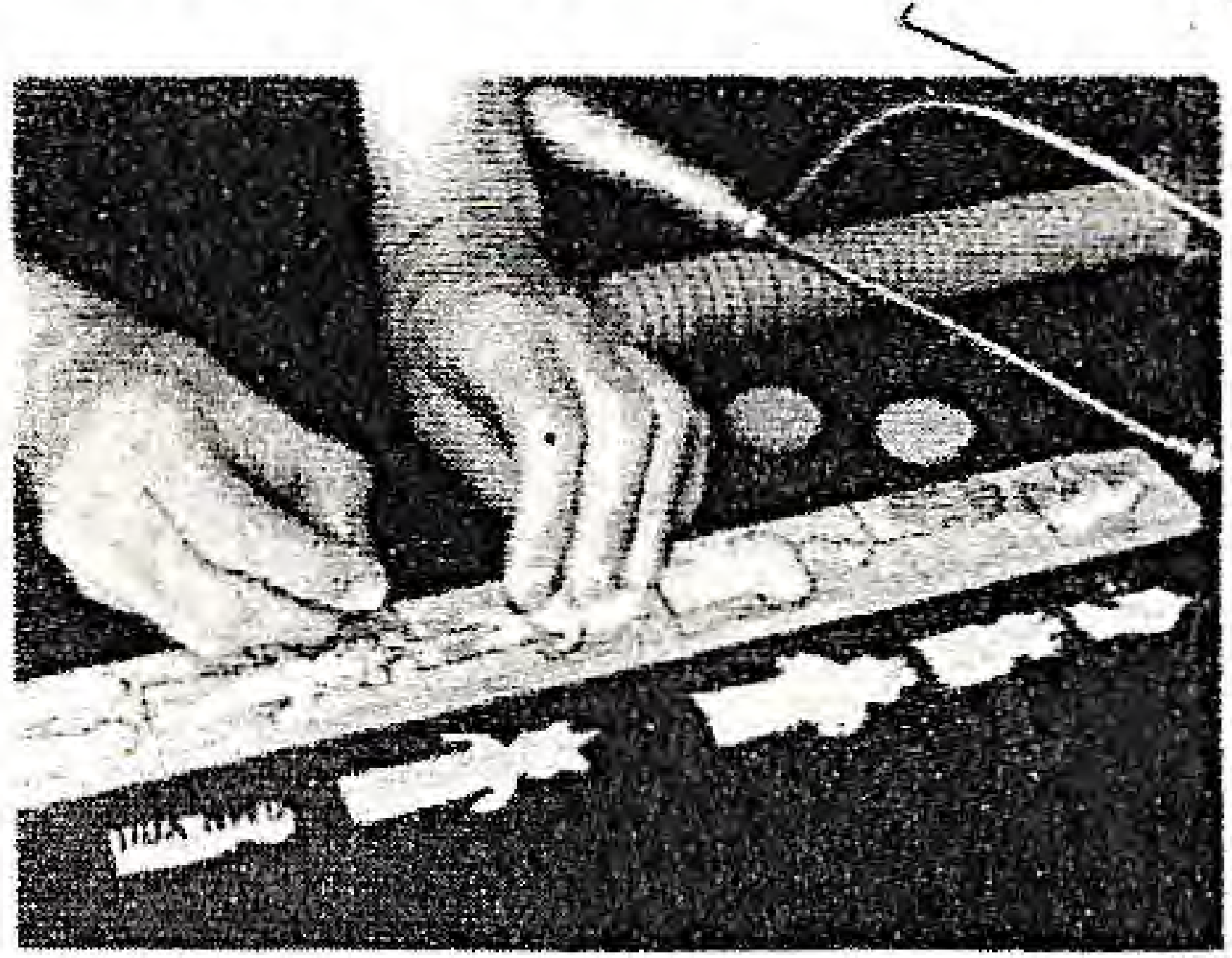
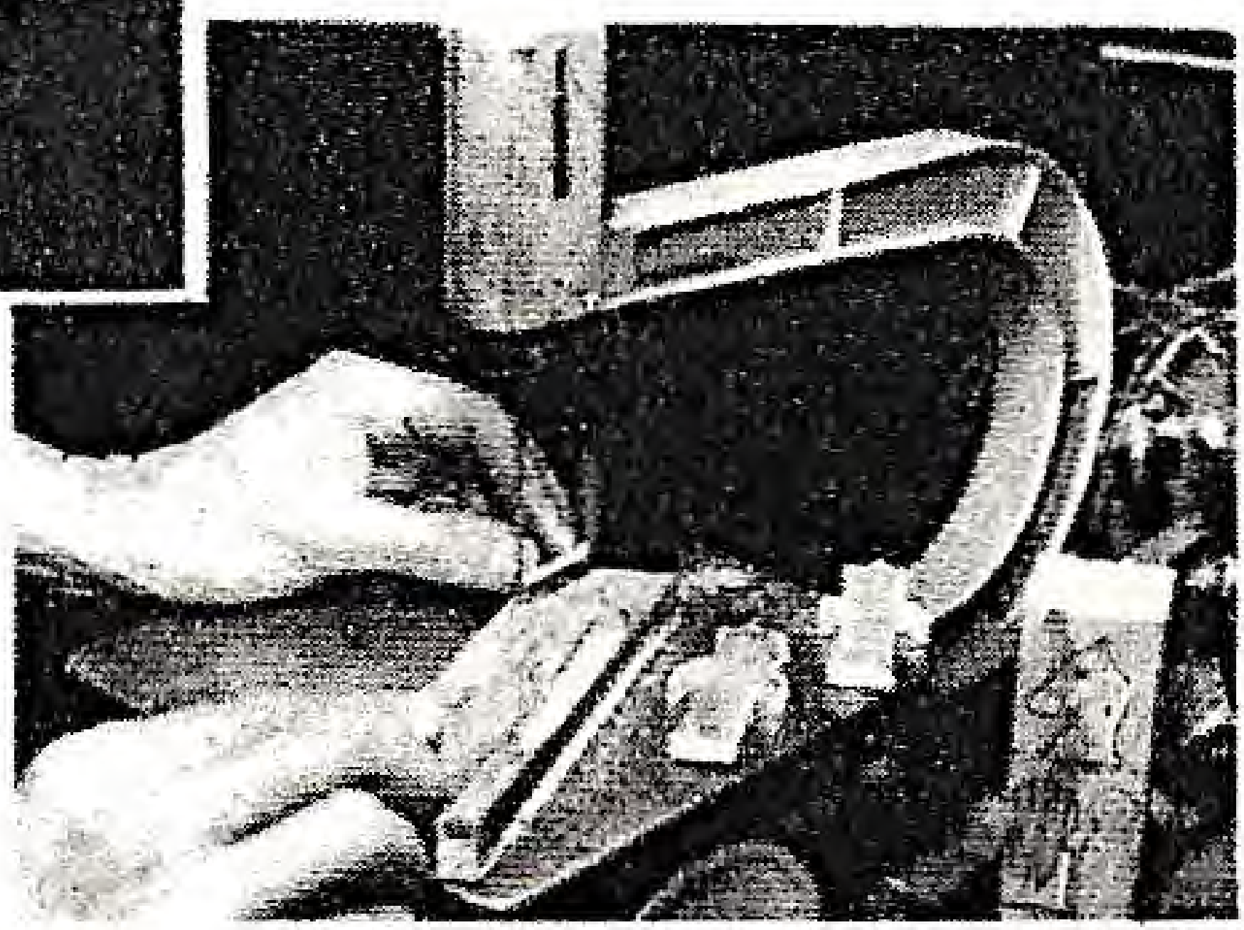


FIG. 2 - DETAIL OF PIECE ASSEMBLY
CUT FROM 1/4" STOCK
GLUE TO BASE
TURNED BASE 1" DIAM. BY 1/4 INCH THICK
2 KINGS 1 WHITE 1 BLACK
2 QUEENS 1 WHITE 1 BLACK
4 BISHOPS 2 WHITE 2 BLACK
CASTLES 2 WHITE 2 BLACK
4 KNIGHTS 2 WHITE 2 BLACK
PAWNS 8 WHITE 8 BLACK

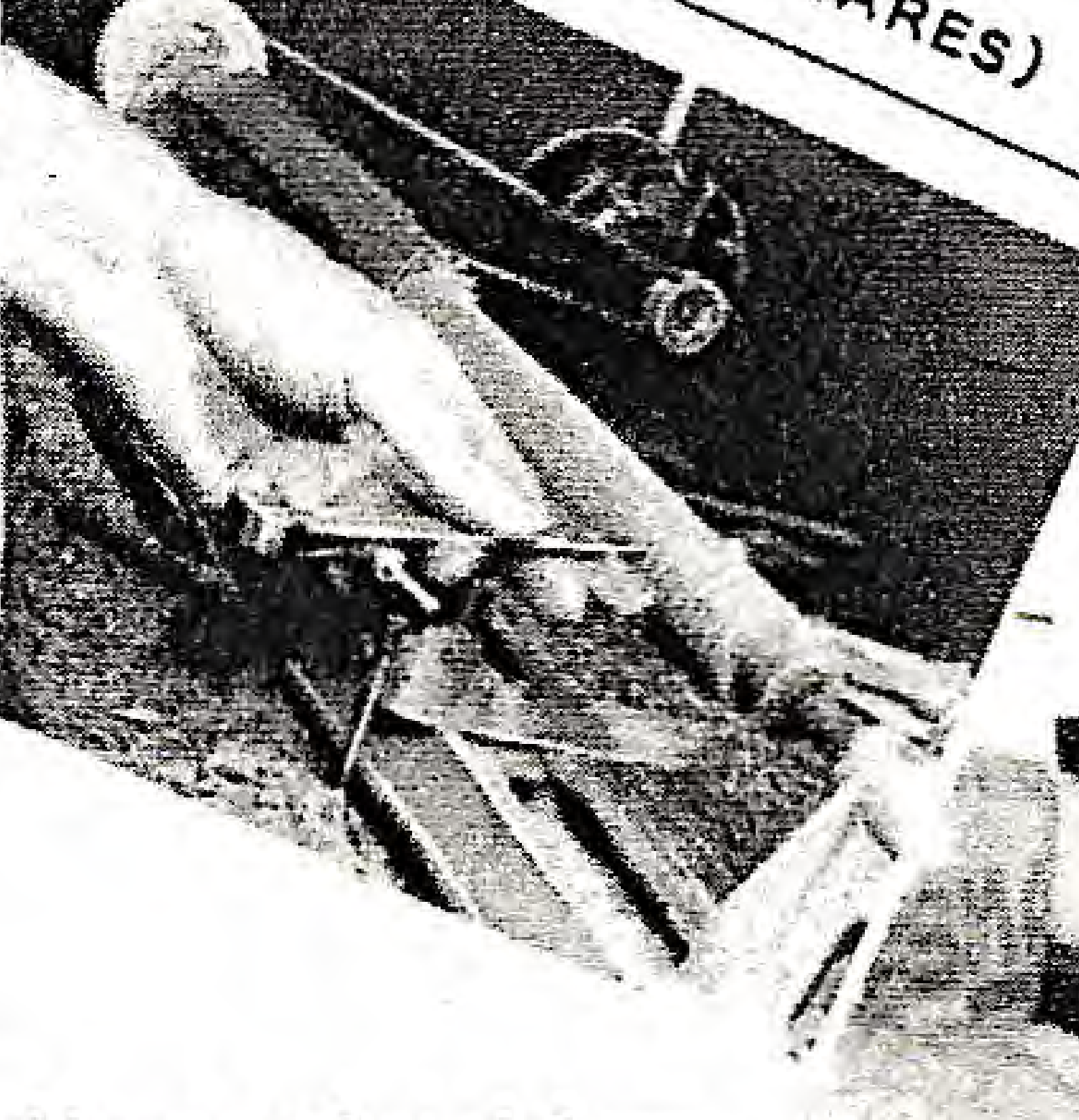
FIG. 1 - CHESSMEN PATTERNS (1/4" SQUARES)



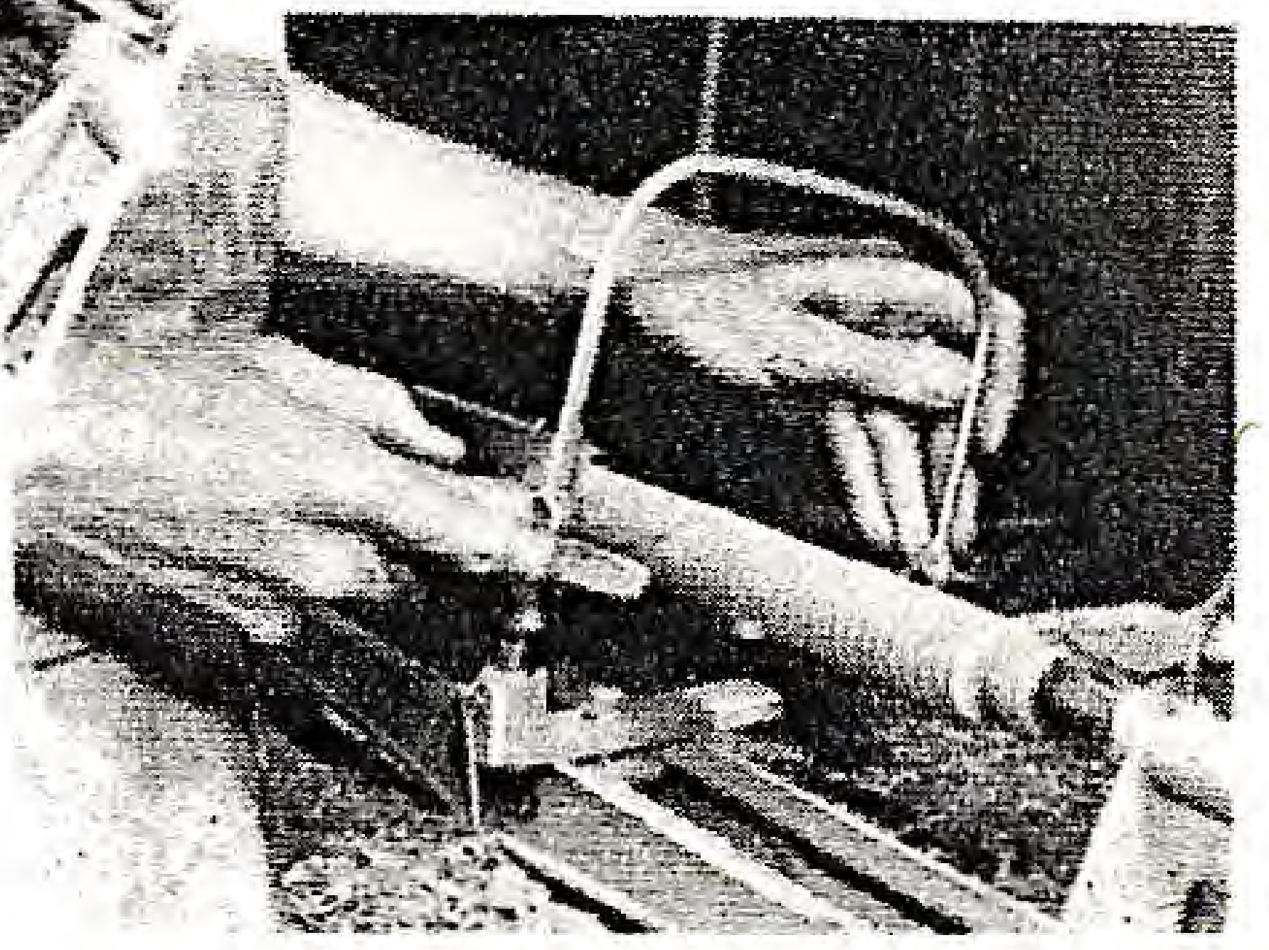
Transfer the paper patterns onto strips of pine lattice as shown in the photo above.



Cutting the pieces out on a jig saw. Note that a number of strips are cut together.



Make full size patterns on heavy paper from the plans shown above.



Above and at right—Two steps in forming the base discs. Use a pair of calipers to measure and mark the width of each disc and partly cut while in lathe.

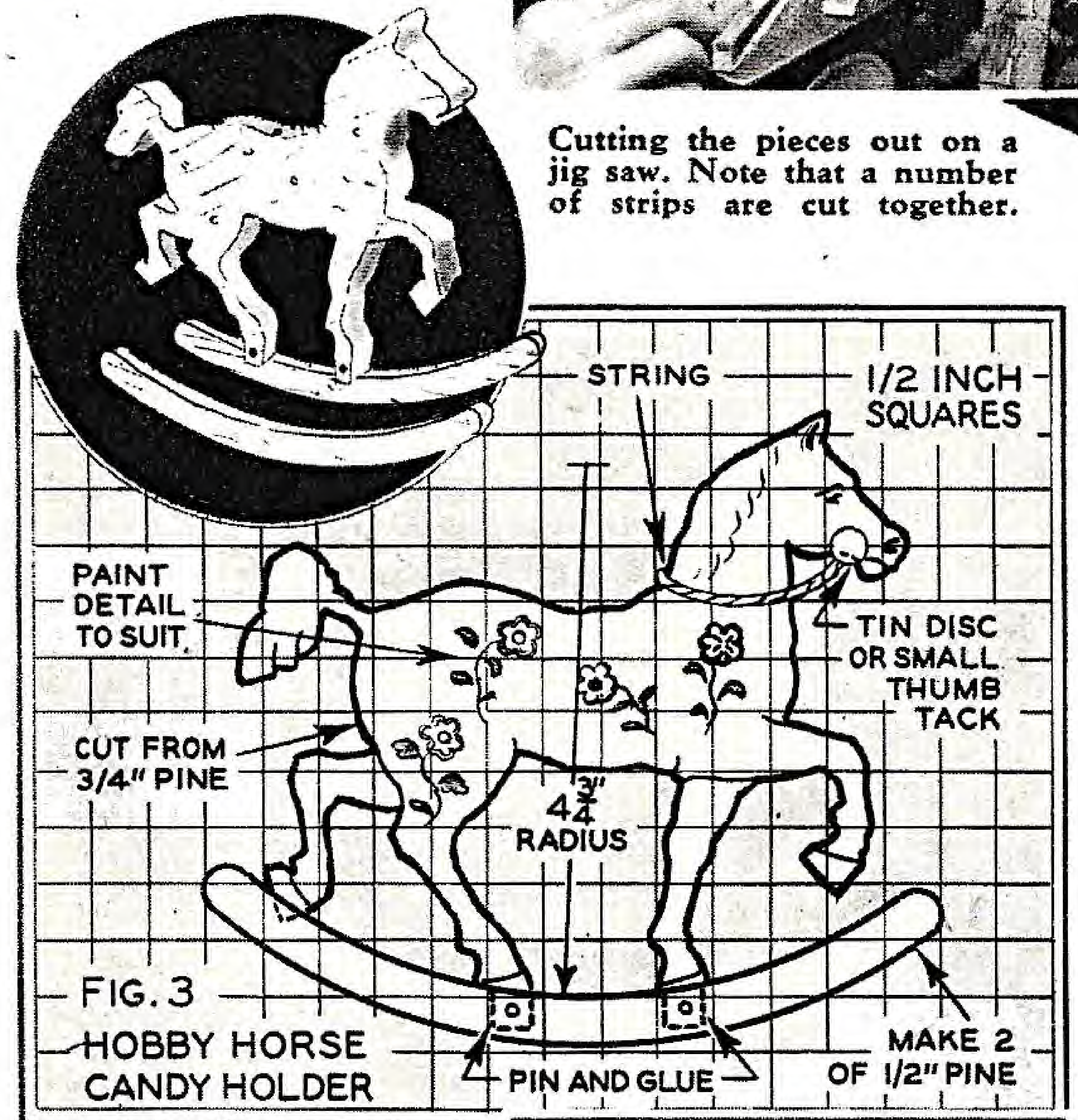
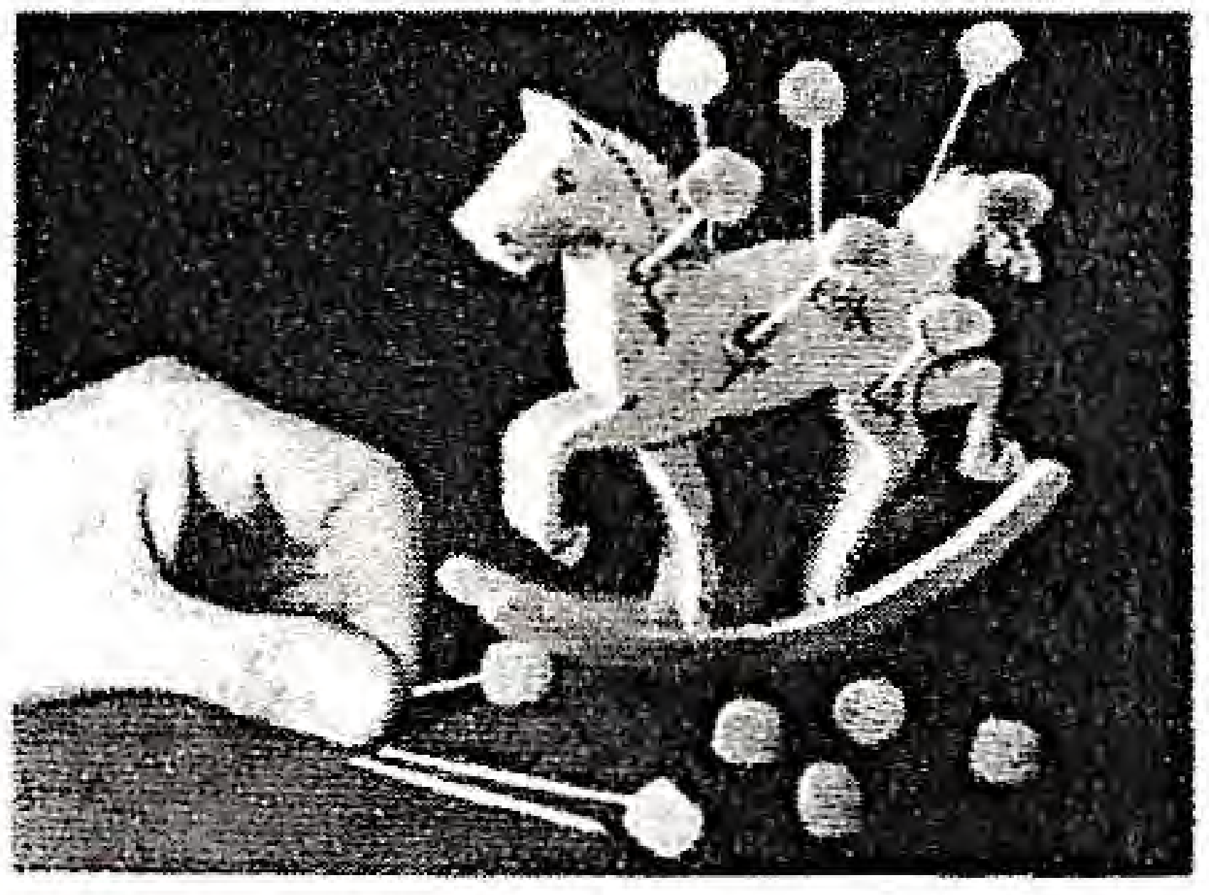

STRING
1/2 INCH SQUARES
PAINT DETAIL TO SUIT
TIN DISC OR SMALL THUMB TACK
CUT FROM 3/4" PINE
4 3/4" RADIUS
MAKE 2 OF 1/2" PINE
PIN AND GLUE

FIG. 3 HOBBY HORSE CANDY HOLDER



The novelty hobby horse for candy or appetizers can also be made for use as a simple toy. Use the above plan to make a full size pattern of the horse, cutting out the various parts so that they appear as shown in the small upper sketch. Punch a few small holes for toothpicks.

by RAY J. MARRAN

HERE is a group of interesting projects which were designed especially for the young shopman. Although simple to make they will be more than appreciated by the friends who receive them this Christmas for gifts. Only simple shop machinery is required to make them and when attractively painted in modern enamels or lacquers they will be on an equal plane with manufactured articles of similar design.

A power jig-saw and moderate wood turning lathe are the only machines required in cutting out the various projects.

For Junior Craftsmen

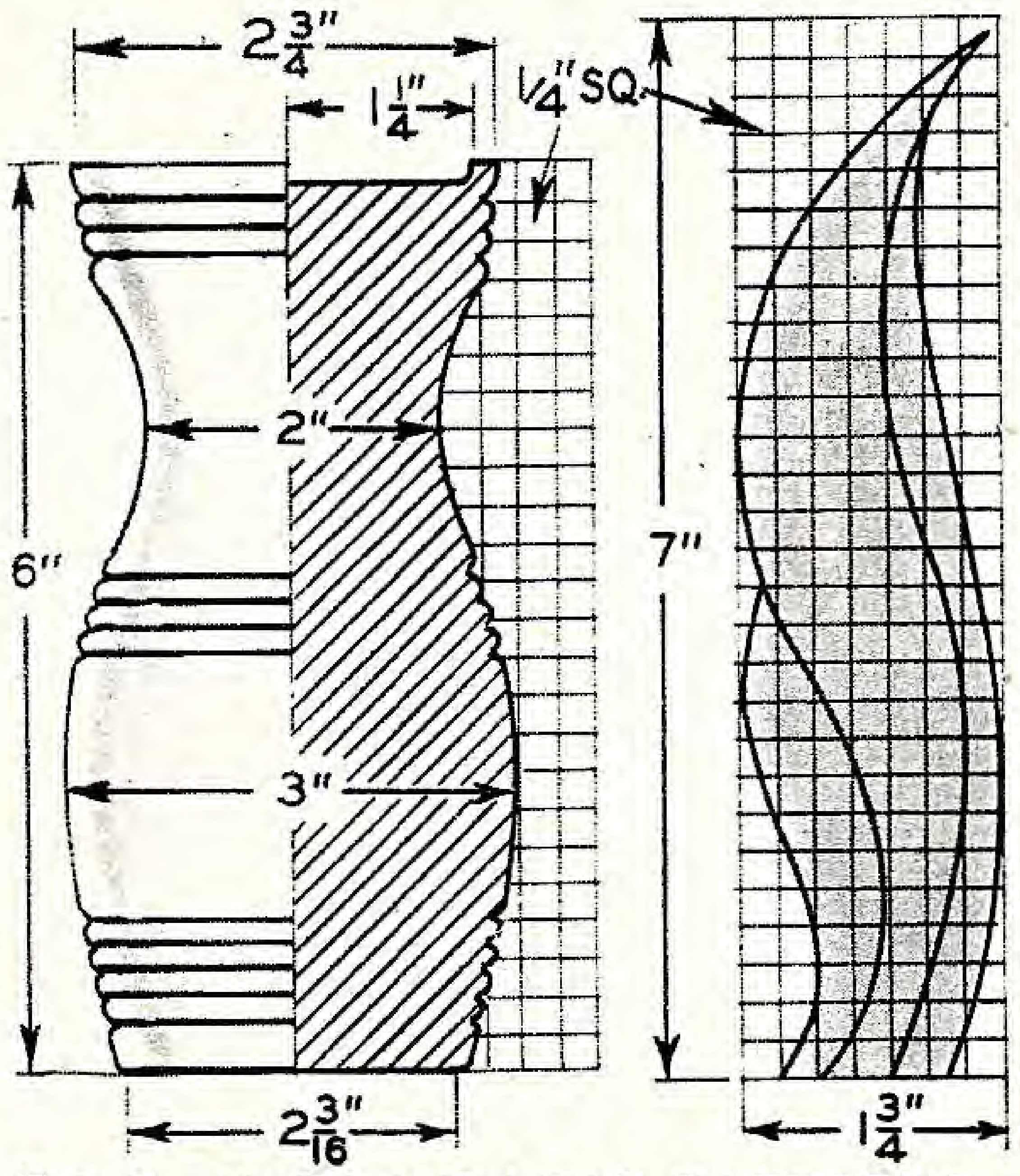

2 3/4"
1 1/4"
1/4" SQ.
2"
6"
3"
7"
2 3/16"
1 3/4"

FIG. 5 – VASE AND LEAF PATTERNS

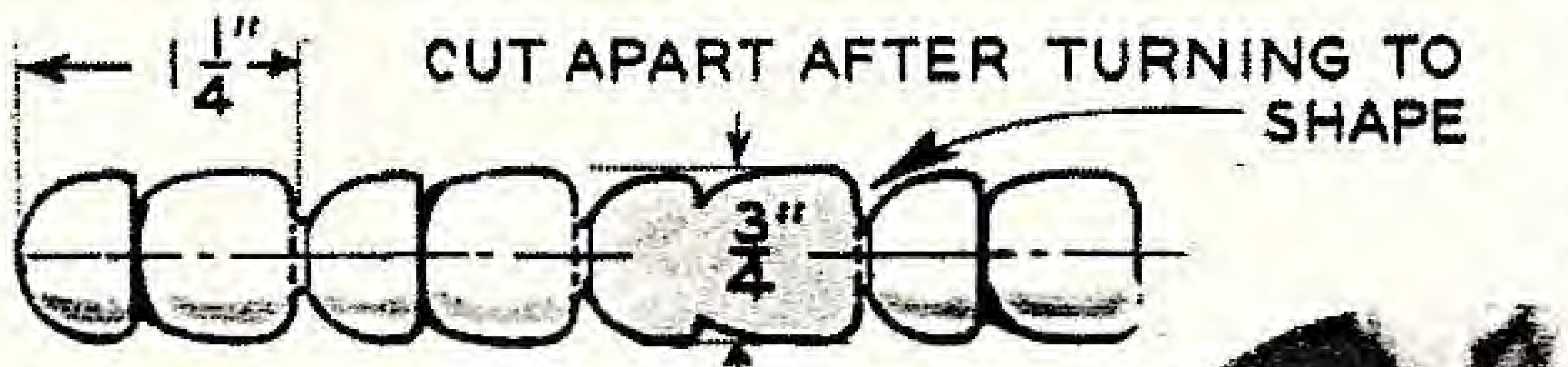
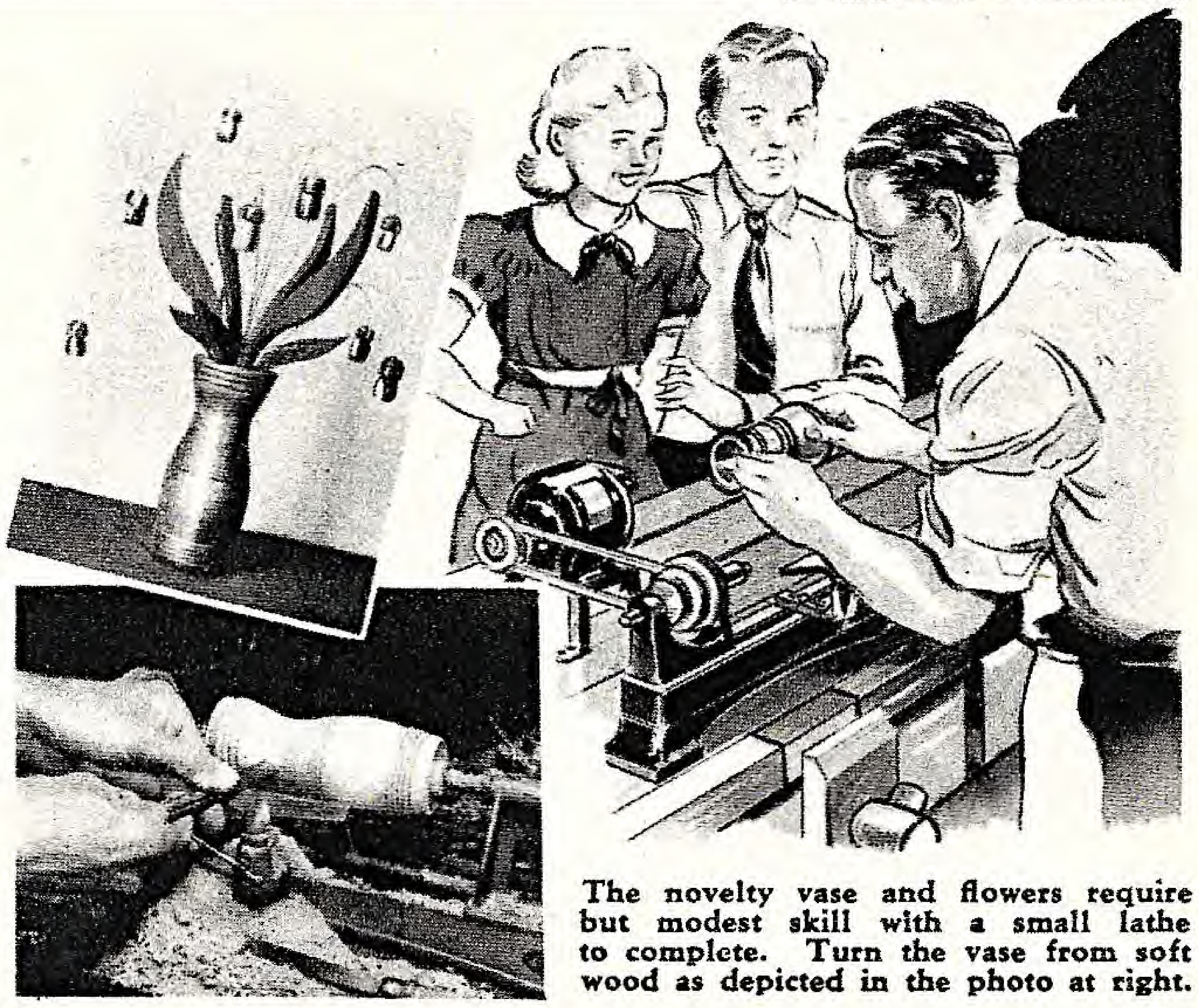
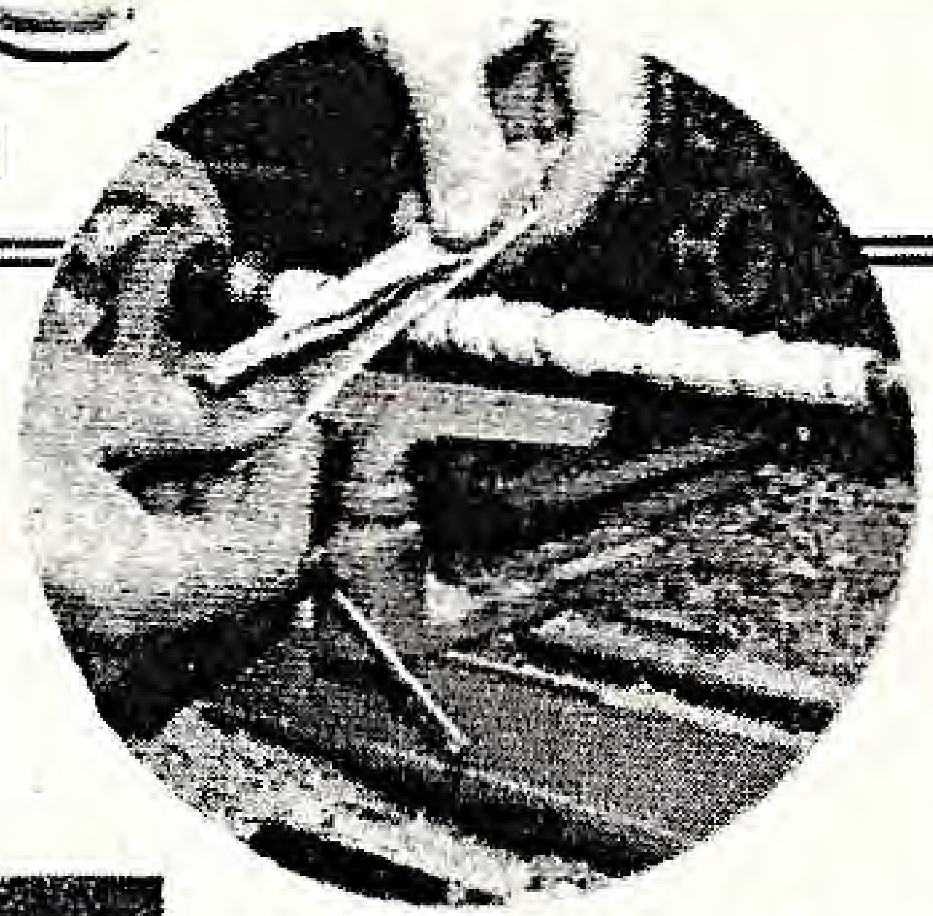

1 1/4"
CUT APART AFTER TURNING TO SHAPE
3/4"

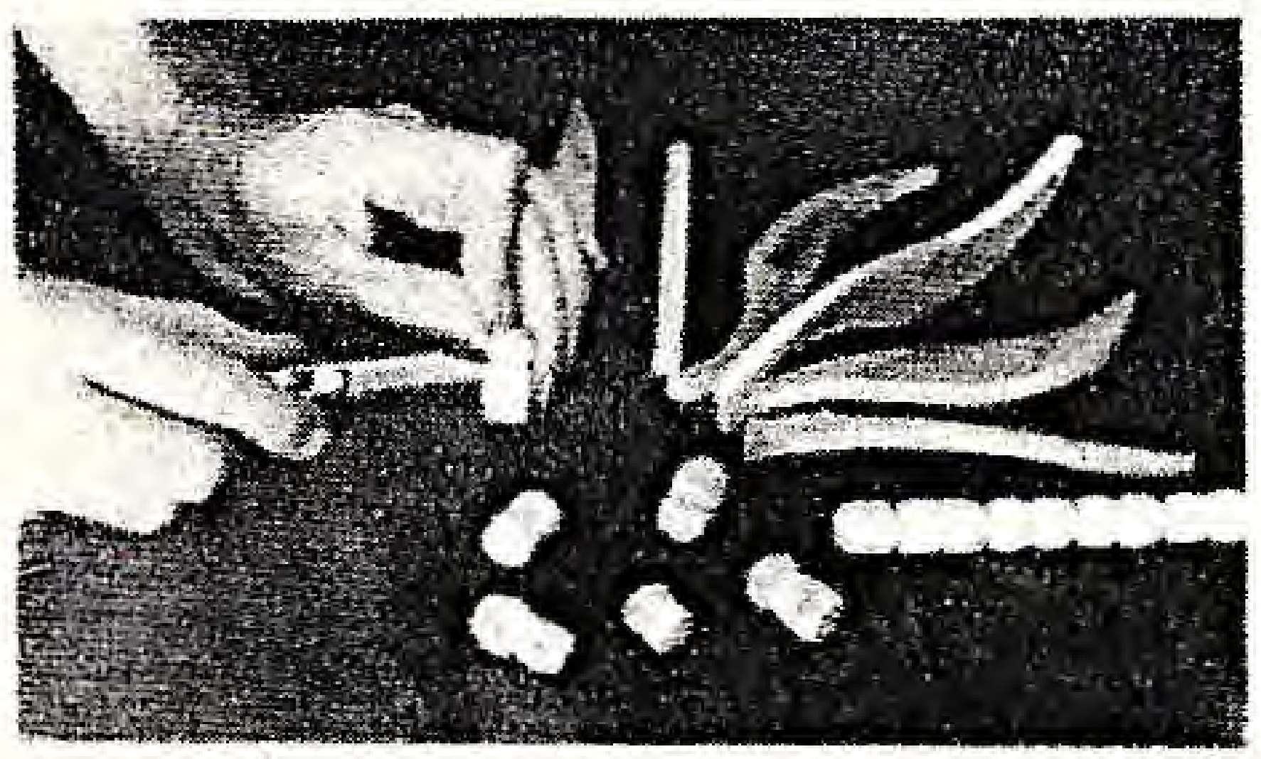
FIG. 6 – FLOWER PATTERN

Use the above patterns for the lathe work and enlarge the leaf pattern to full size before attempting to cut out these parts, using the 1/2" squares to duplicate the plan.



The novelty vase and flowers require but modest skill with a small lathe to complete. Turn the vase from soft wood as depicted in the photo at right.





Above — Shaping and smoothing the buds on a lathe. Left — Notching the buds with a knife to represent petals. Attach to vase with fine wire.

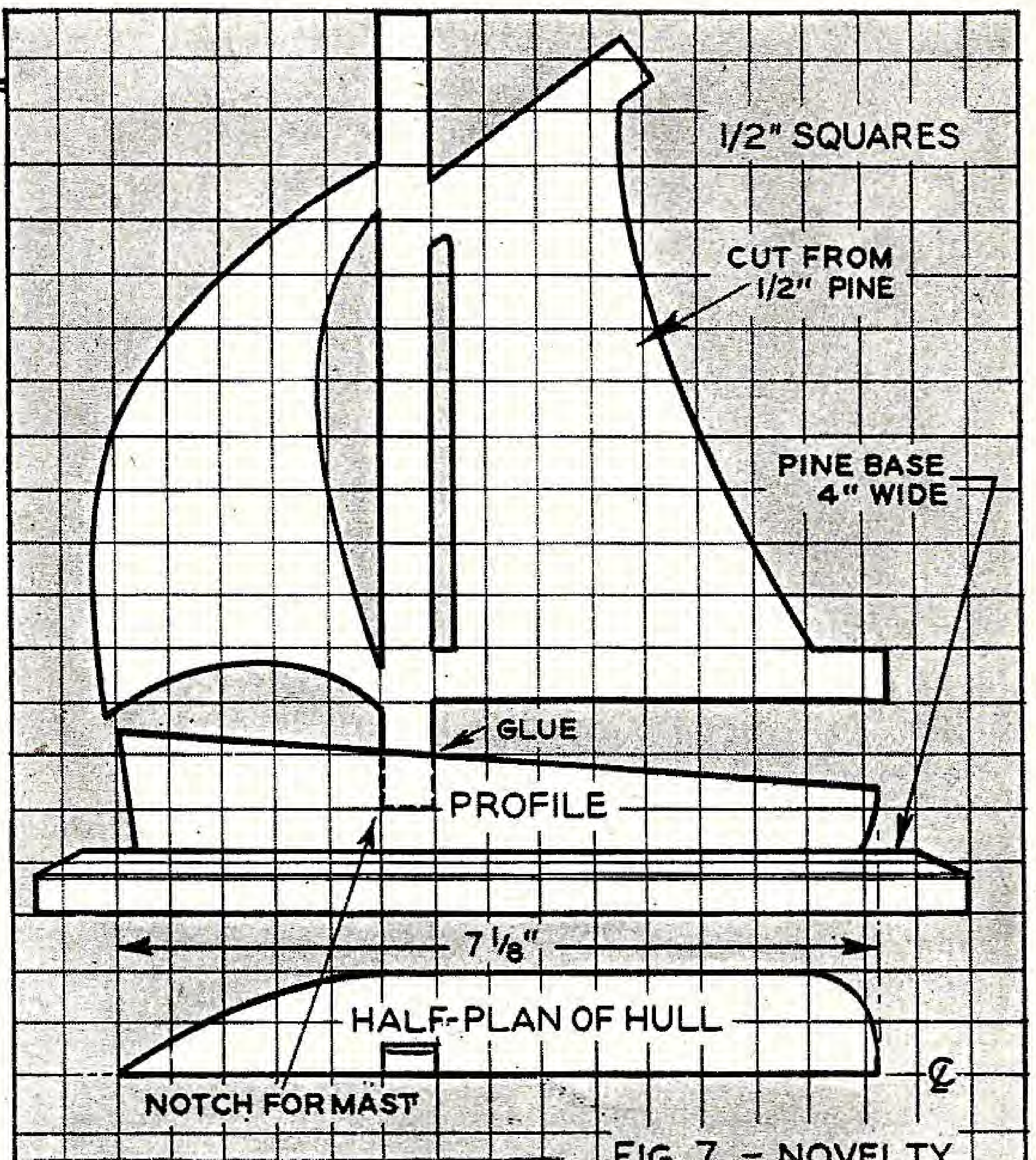
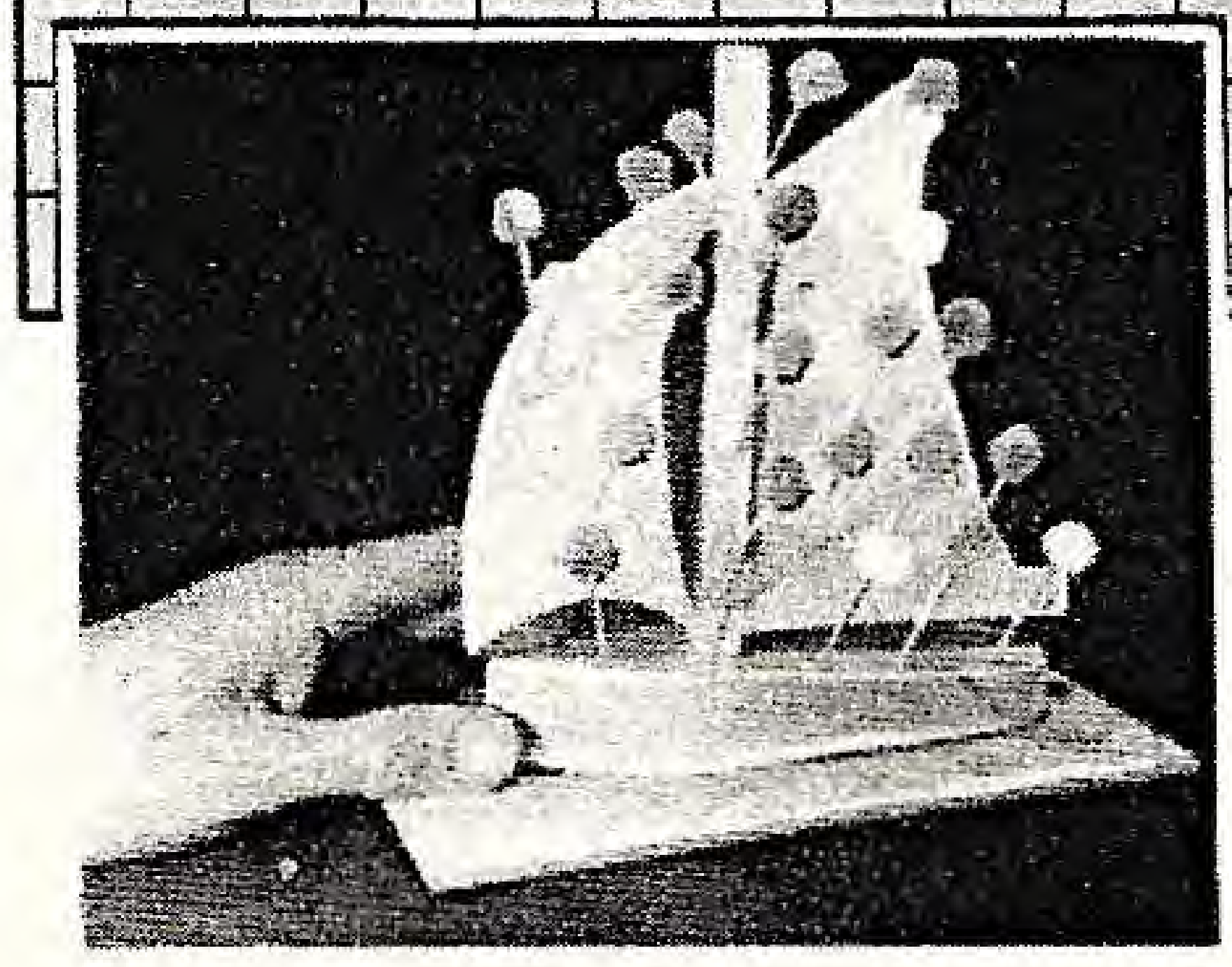

1/2" SQUARES
CUT FROM 1/2" PINE
PINE BASE 4" WIDE
GLUE
PROFILE
7 1/8"
HALF-PLAN OF HULL
NOTCH FOR MAST
℄

FIG. 7 – NOVELTY SHIP HOLDER FOR HORS-D'OEUVRES

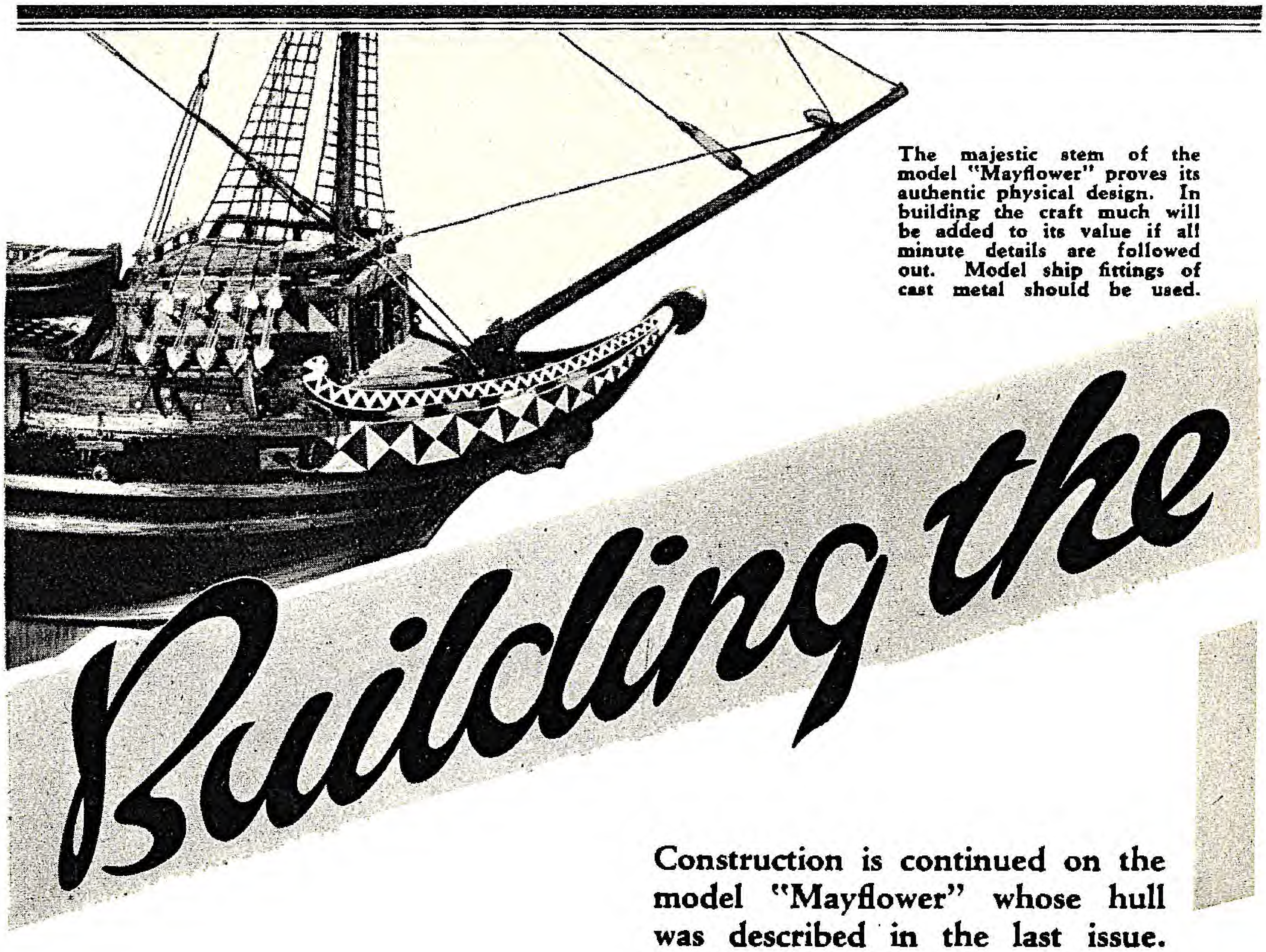


The novelty ship candy or appetizer holder shown at left is the simplest of all these easily built novelties. Cut out the hull block to above plans and glue it to wooden base as shown. Cut mast and sails in one piece.

The construction work is extremely simple in all instances, but this does not mean that the articles should be cut out hurriedly. Care will result in neat gifts that you can be proud of.

While chessmen are usually turned on a lathe from hardwood, they are too common in design to command any unusual attention. Therefore, a set of distinct design was chosen which could be cut out on a power jig-saw. The complete set consists of thirty-two pieces, sixteen white and sixteen black or red. Cut out from plywood, according to the patterns shown in the accompanying drawings, two kings, two

[*Continued on page* 132]



The majestic stem of the model "Mayflower" proves its authentic physical design. In building the craft much will be added to its value if all minute details are followed out. Model ship fittings of cast metal should be used.

Building the

Construction is continued on the model "Mayflower" whose hull was described in the last issue. With this installment the attractive little ship begins to take shape.

by ERLING W. EKLOF

PART II

BUILDING an authentic scale model of the famous ship, "Mayflower," has been the ambition of many craftsmen and hobbyists, but due to lack of authoritative plans their ambition has never been realized. While not difficult to construct such a model, nevertheless, requires basic plans before it can be attempted by the average craftsman. Here is a model that will command the undivided attention of your friends and will mark you as a more than ordinary modelmaker.

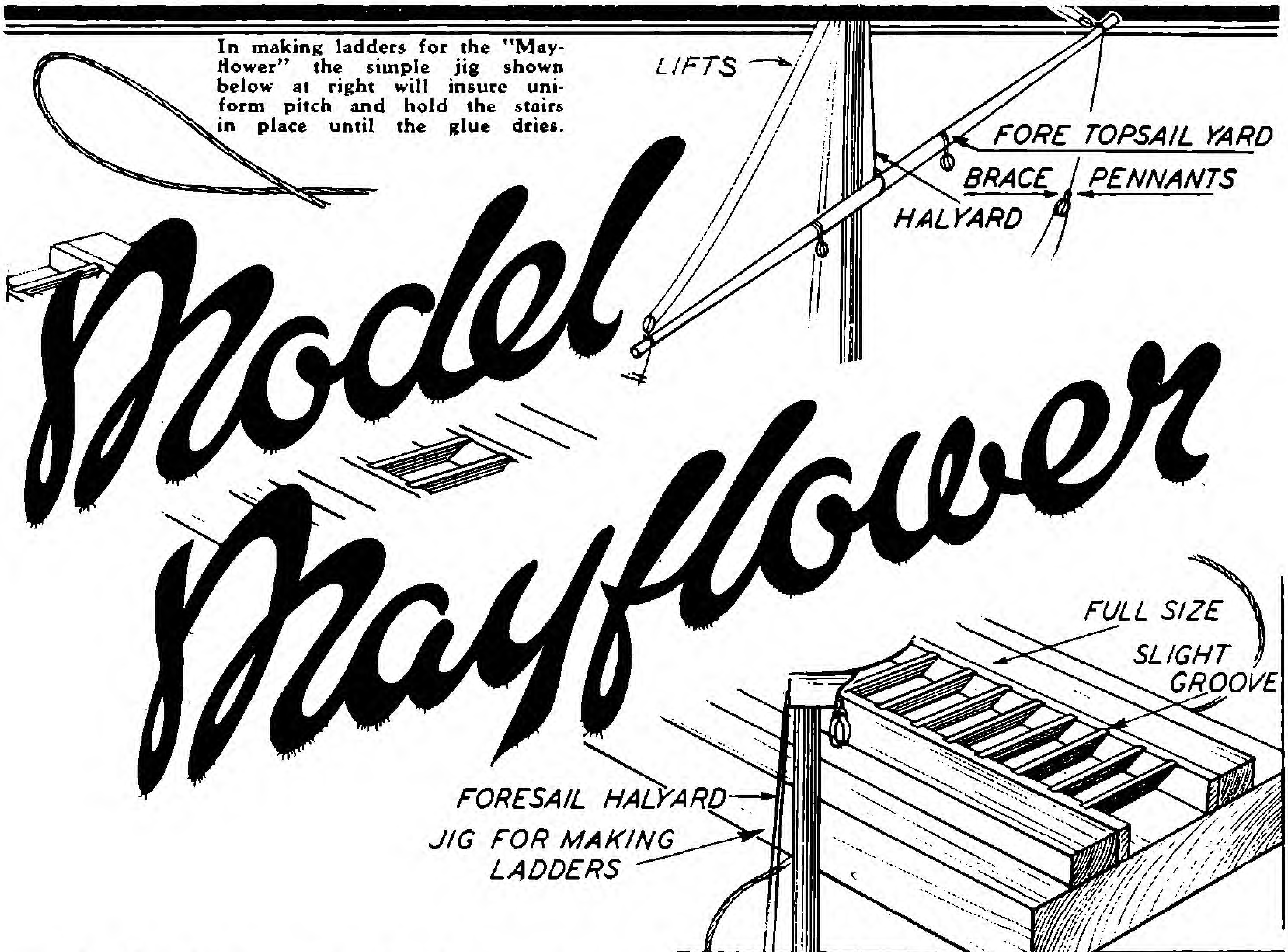
Following as closely as historical data would permit the model is built to the scale of $\frac{3}{16}$-inch to 1-foot making it ideal in size for a fireplace or table decoration. The hull is carved first, as was described in the first installment which appeared in the November issue, after which the deck grill, cabin and other incidentals were installed.

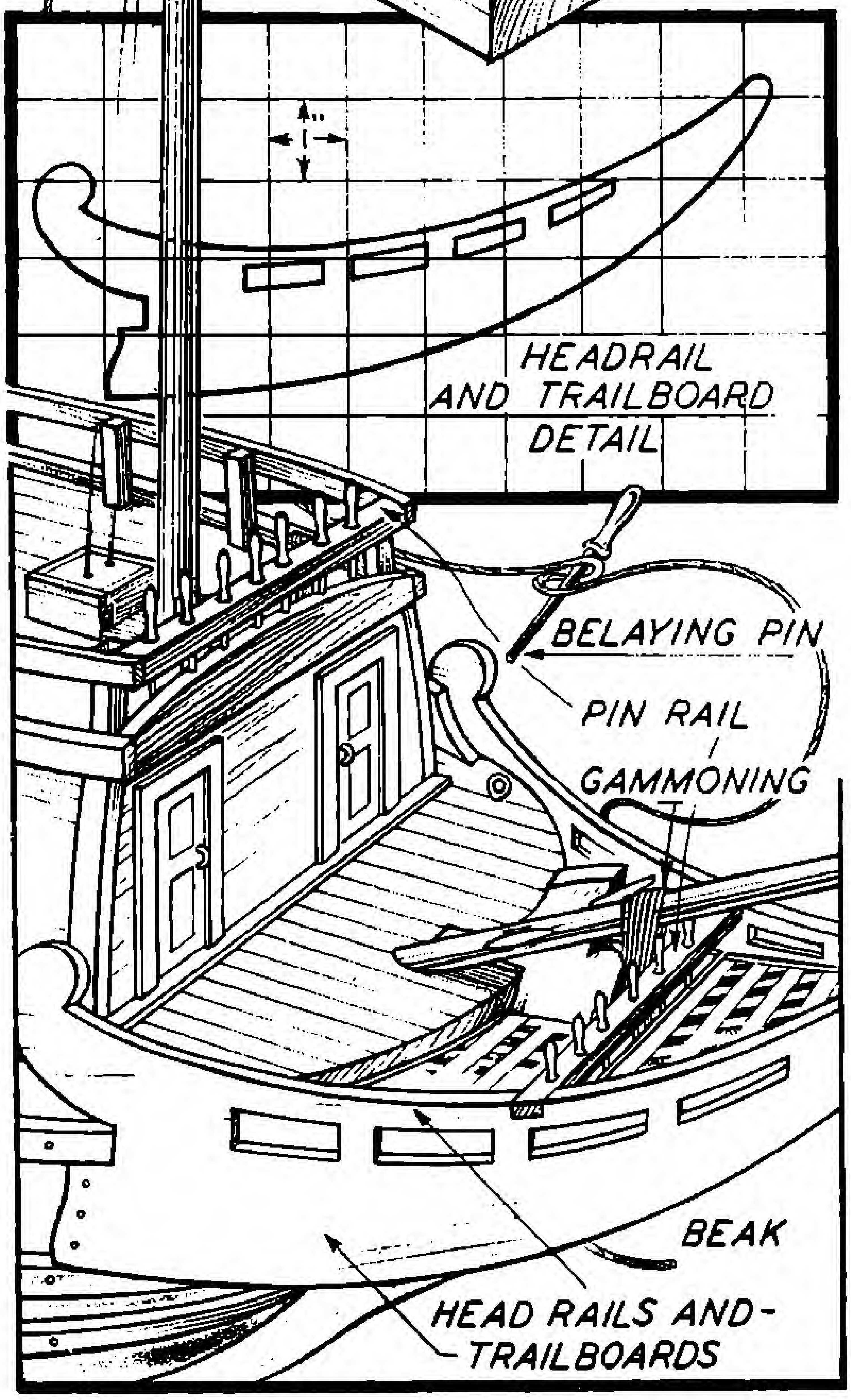
The head rails and trail boards are next. These are fashioned in one piece, nailed and glued to the hull at the forward end of the bulwarks. The forward end of the trail board is fastened to the beak of the cut-water. The exact position can be seen on the drawing. Extending horizontally between the trail board in the direction of the beam, is a timber to hold the gratings. The gratings may be punched out of fibre, board, or thin three-ply wood.

A better way is to make them out of strips of pine, a shade under $\frac{1}{8}$-inch by $\frac{3}{16}$-inch. In other words, the same method as was outlined for the main hatch. This may entail a bit more work, but is much more satisfactory when finished. After you have laid up and glued a portion of hatch work, 2¾ inches wide by 4 inches long, let dry and then sandpaper. Then saw out the shape of the three gratings with a fine scroll saw and glue fine strips along the sawed edges. Where it is curved, soak the strip in boiling water to make easier its gluing into position. Refer to the plan for the shape of these gratings. Make the partners for the mast and knightheads as illustrated. You should get a kick out of making the Belfry. Fashion the brackets first, nail and glue these into place between the doors under the overhang of the half deck. Use fine brads for this. Drill holes to take the supporting posts which are

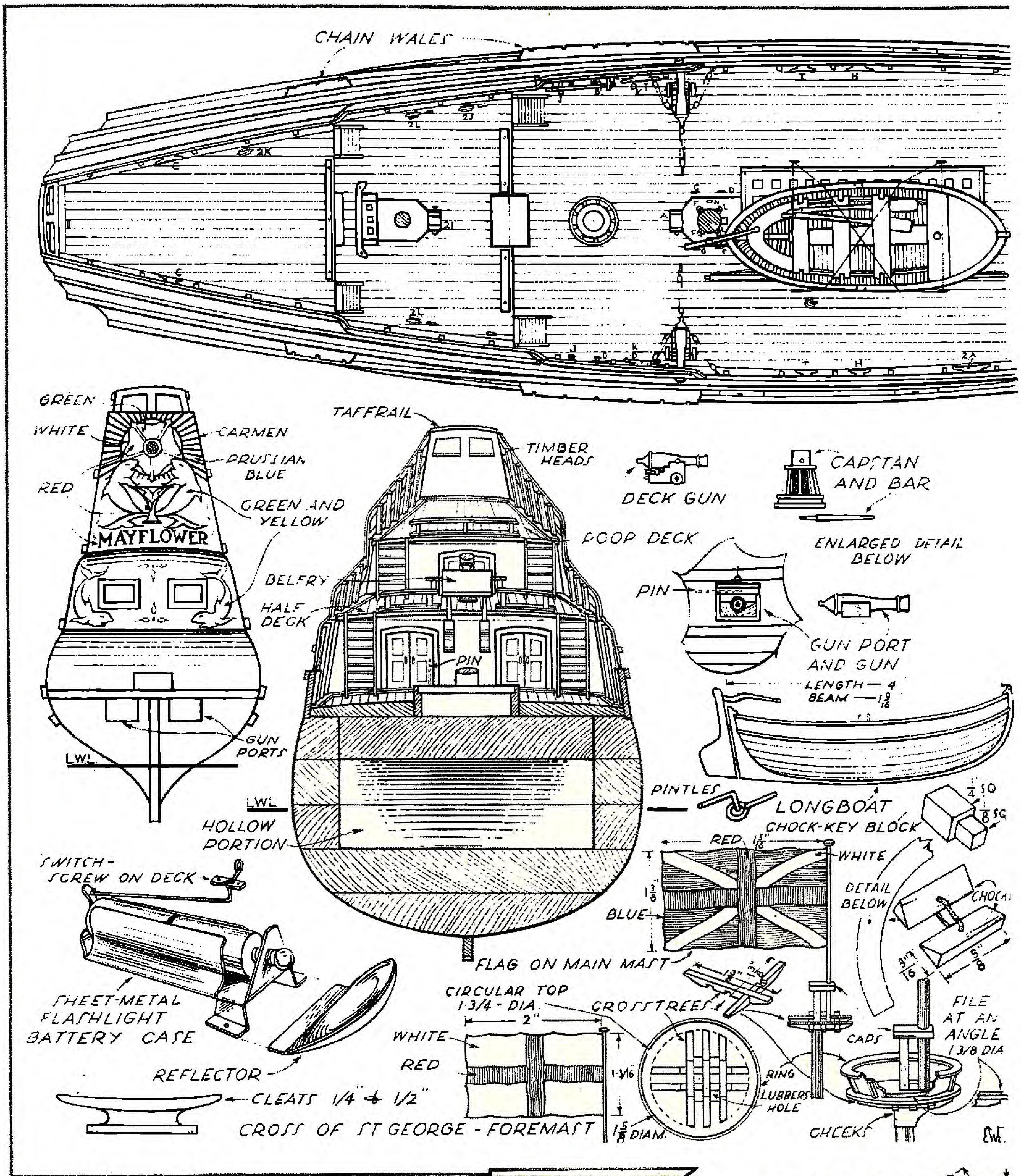
Model Mayflower

In making ladders for the "Mayflower" the simple jig shown below at right will insure uniform pitch and hold the stairs in place until the glue dries.


LIFTS
FORE TOPSAIL YARD
BRACE
PENNANTS
HALYARD
FULL SIZE
SLIGHT GROOVE
FORESAIL HALYARD
JIG FOR MAKING LADDERS

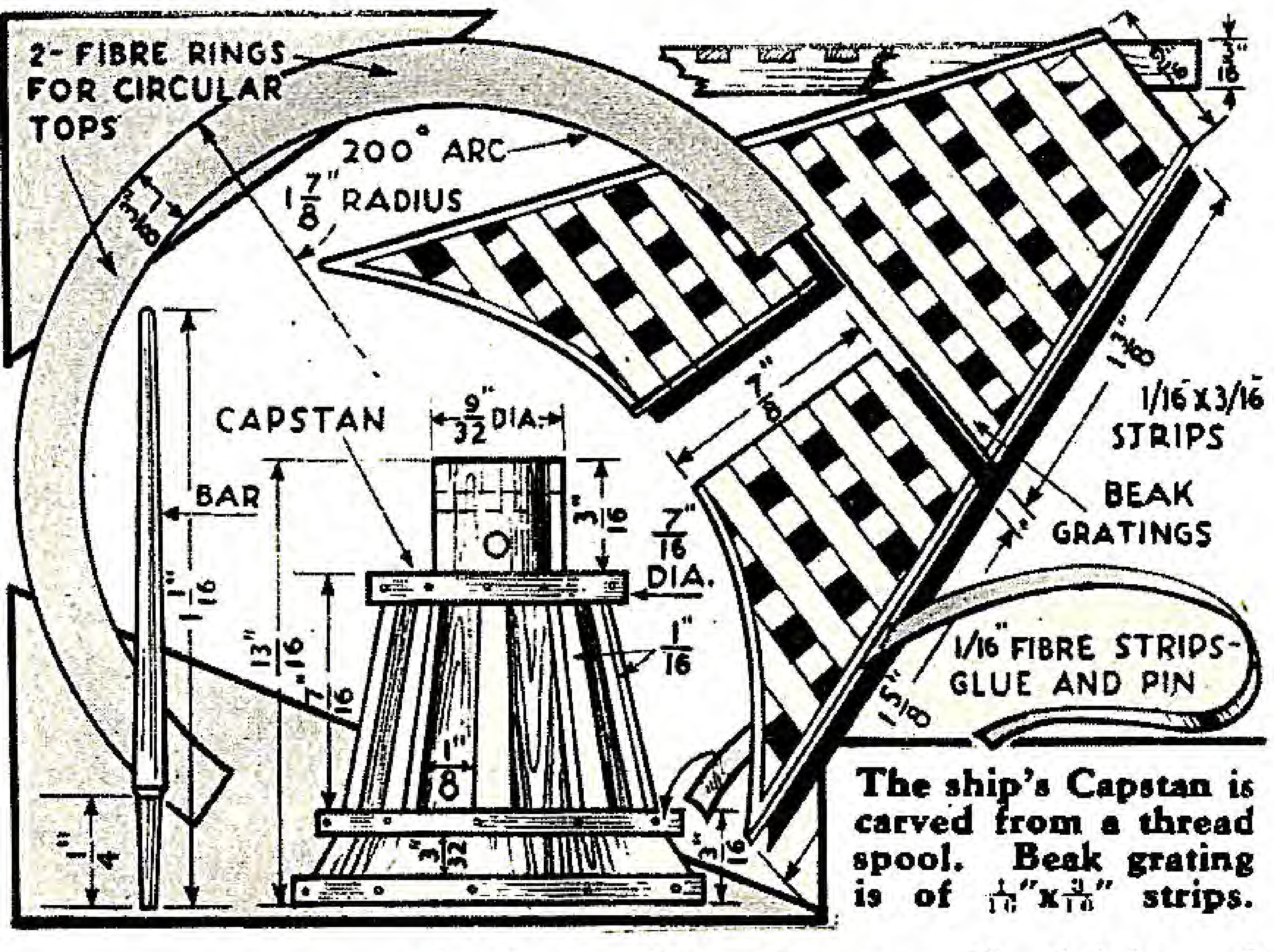

1"
1"
HEADRAIL AND TRAILBOARD DETAIL
BELAYING PIN
PIN RAIL
GAMMONING
BEAK
HEAD RAILS AND TRAILBOARDS

round. For this round toothpicks serve very well. Cut out the roof from a piece of pine, drill holes in it to slip down over the posts. Hang the bell on a small pin under the belfry roof and glue the roof into place. Be sure that all the posts stand truly perpendicular and the lower edges of the roof level with the deck. Survey your work and if it looks O. K., we will start on the timber heads and rail. Oh, yes, in regards to the bell, it can be turned on a lathe from brass or wood or can be bought from Model ship supply houses. Getting back to the timber heads. Inside the bulwark on the main deck, there will be eleven timber heads, spaced at ¾-inch intervals with the three aft, standing ⅜-inch above the raised bulwarks. On the forecastle deck there are four timber heads on each side. On the half deck, three on each side, on the poop deck, five on each side. These are all spaced at ¾-inch intervals and stand ⅜-inch above the cabin sides. On the fore edge of the poop and half decks are hand rails ending where the steps rise. On the forecastle deck are pin rails on the fore and aft edge, with holes drilled for belaying pins. In order to get these timber heads in place, lay in at the water ways on all the decks $\frac{1}{16}$-inch by $\frac{3}{16}$-inch covering planks. I made these of white birch, but they can be made of

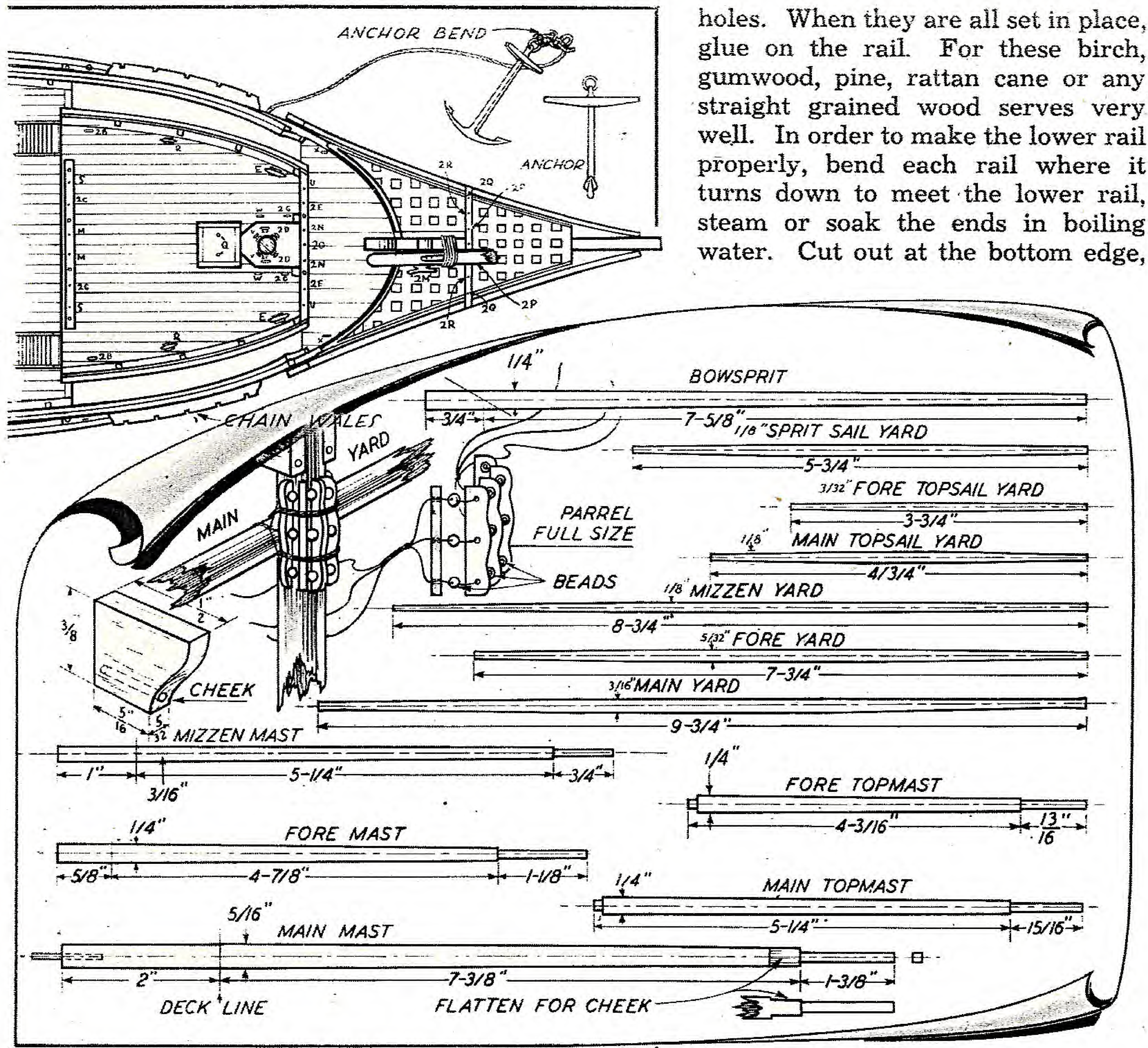

CHAIN WALES
GREEN
WHITE
CARMEN
PRUSSIAN BLUE
RED
GREEN AND YELLOW
MAYFLOWER
BELFRY
HALF DECK
GUN PORTS
LWL
TAFFRAIL
TIMBER HEADS
POOP DECK
PIN
HOLLOW PORTION
DECK GUN
CAPSTAN AND BAR
ENLARGED DETAIL BELOW
GUN PORT AND GUN
LENGTH — 4
BEAM — 1 9/16
PINTLES
LONGBOAT
CHOCK-KEY BLOCK
1/4 SQ
1/8 SQ
RED 1 5/16"
WHITE
BLUE
1 3/8
DETAIL BELOW
CHOCK
3 1/16
FLAG ON MAIN MAST
SWITCH-SCREW ON DECK
SHEET-METAL FLASHLIGHT BATTERY CASE
REFLECTOR
CLEATS 1/4 + 1/2"
CIRCULAR TOP 1-3/4-DIA.
2"
WHITE
RED
1-1/16
CROSSTREES
RING
LUBBERS HOLE
CAPS
FILE AT AN ANGLE
1 3/8 DIA
CROSS OF ST GEORGE - FOREMAST
1 5/8 DIAM.
CHEEKS
S.W.T.

Arrangement of the "Mayflower" deck fixtures is shown in the above diagram. A sheet metal battery box provided with a bulb and reflector will illuminate the ship through the deck grating if mounted in the hollow portion of the hull. Paint ship as indicated.

pine. Nail and glue them. Birch makes good timber heads and posts. They should be $\frac{3}{32}$-inch square, their lower ends sunk through the covering boards and into the deck. They stand perpendicular to the water line, but slant slightly inward the same as the cabin sides. To sink them, drill holes the same diameter as their width. Round the lower end about ¼-inch and glue into the

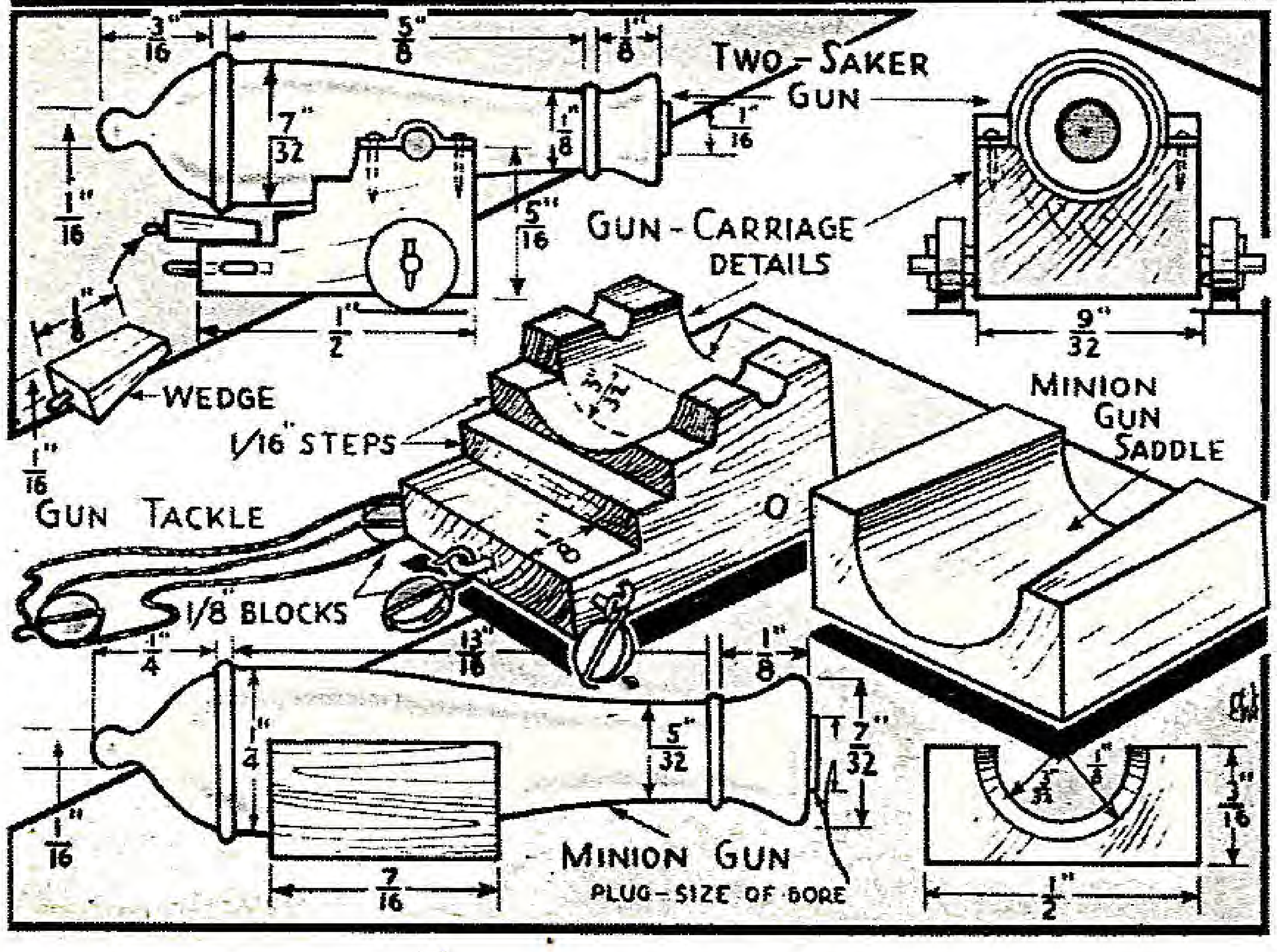

2-FIBRE RINGS FOR CIRCULAR TOPS
200° ARC
1 7/8" RADIUS
3/8
CAPSTAN
9/32" DIA.
BAR
3/16
7/16" DIA.
1/16"
1 1/16"
13/16"
7/16
1/8"
3/32
1/4
3/16
7/8"
1 3/16
1/16 X 3/16 STRIPS
BEAK GRATINGS
1/16" FIBRE STRIPS-GLUE AND PIN
1 5/16
5/16
3/16

The ship's Capstan is carved from a thread spool. Beak grating is of $\frac{1}{16}$"x$\frac{3}{16}$" strips.


ANCHOR BEND
ANCHOR
CHAIN WALES
2R
2Q
2P
2N
2O
2E
2F
2G
2D
2B
2M
1C
S
M
Q
E
R
U
W
X
MAIN
YARD
PARREL FULL SIZE
BEADS
CHEEK
3/8
1"/2
5"/16
5"/32
BOWSPRIT
1/4"
3/4"
7-5/8"
1/8" SPRIT SAIL YARD
5-3/4"
3/32" FORE TOPSAIL YARD
3-3/4"
1/8" MAIN TOPSAIL YARD
4/3/4"
1/8" MIZZEN YARD
8-3/4"
5/32" FORE YARD
7-3/4"
3/16" MAIN YARD
9-3/4"
MIZZEN MAST
1"
5-1/4"
3/4"
3/16"
1/4"
FORE TOPMAST
4-3/16"
13"/16
1/4"
FORE MAST
5/8"
4-7/8"
1-1/8"
1/4"
MAIN TOPMAST
5-1/4"
15/16"
5/16"
MAIN MAST
2"
7-3/8"
1-3/8"
DECK LINE
FLATTEN FOR CHEEK

RIGGING DESIGNATIONS

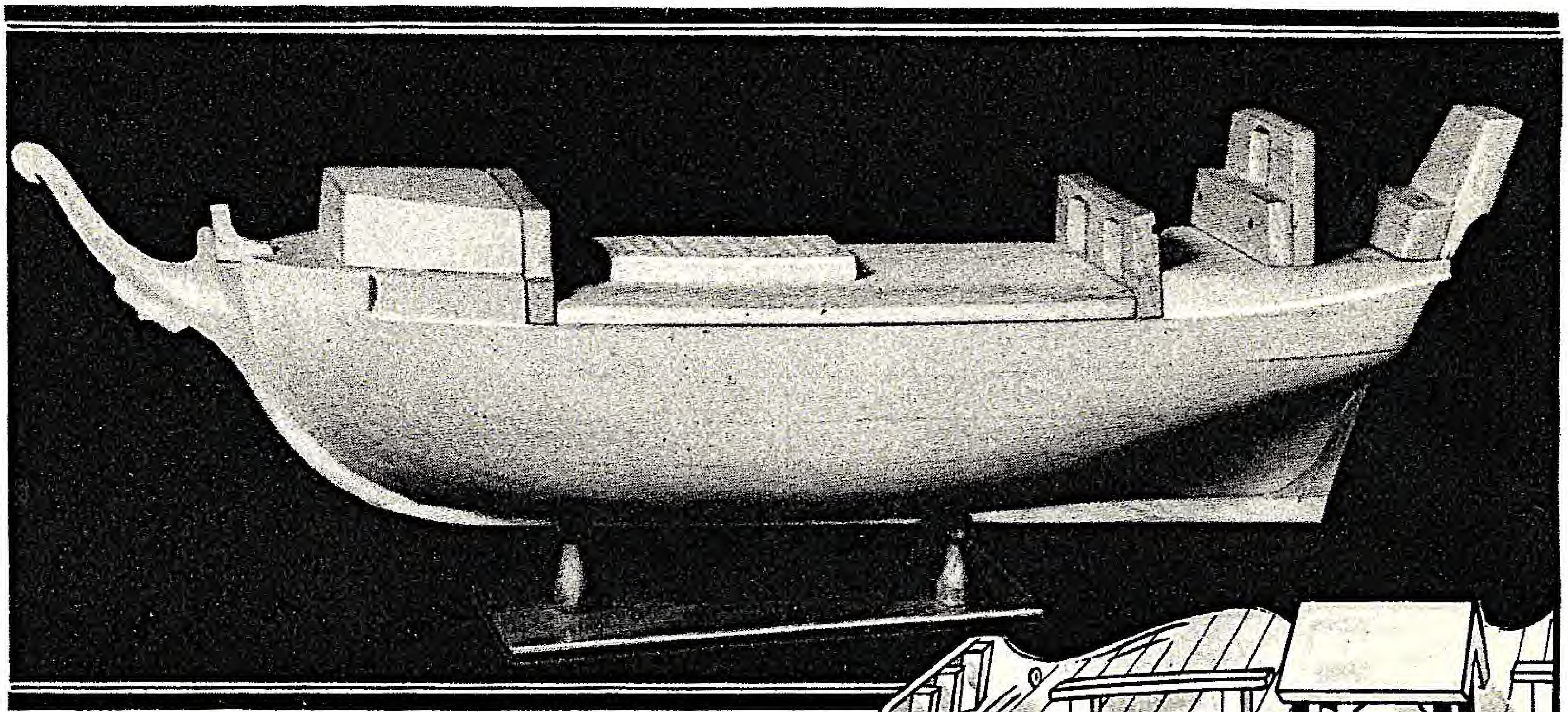
A - MAIN-SAIL HALYARD	N-MAIN-TOPSAIL CLEWLINE	2C-FORE-TOPSAIL BRACES
B " " LIFTS	O " " BUNTLINES	2D " " SHEETS
C " " BRACES		2E " " BOWLINES
D " " SHEETS	Q FORE-SAIL HALYARD	2F " " CLEWLINES
E " " BOWLINES	R " " LIFTS	2G " " BUNTLINES
F " " CLEWLINES	S " " BRACES	
G " " BUNTLINES	T " " SHEETS	2I-MIZZEN-HALYARD
H " " TACKS	U " " BOWLINES	2J " LIFTS
I MAIN-TOPSAIL HALYARD	V " " CLEWLINES	2K " SHEETS
J " " LIFTS	W " " BUNTLINES	2L " TACKS
K " " BRACES	X " " TACKS	SPRITSAIL on
L " " SHEETS	2A-FORE-TOPSAIL HALYARD	PLATE THREE
M " " BOWLINES	2B " " LIFTS	


3"/16
5"/8
1"/8
TWO-SAKER GUN
1"/16
7"/32
1"/8
5"/16
GUN-CARRIAGE DETAILS
1"/16
1"/8
1"/2
WEDGE
1/16" STEPS
1"/16
GUN TACKLE
1/8" BLOCKS
9"/32
MINION GUN SADDLE
1"/4
13"/16
1"/8
5"/32
7"/32
3"/16
1"/16
7"/16
1"/2
MINION GUN
PLUG-SIZE OF BORE

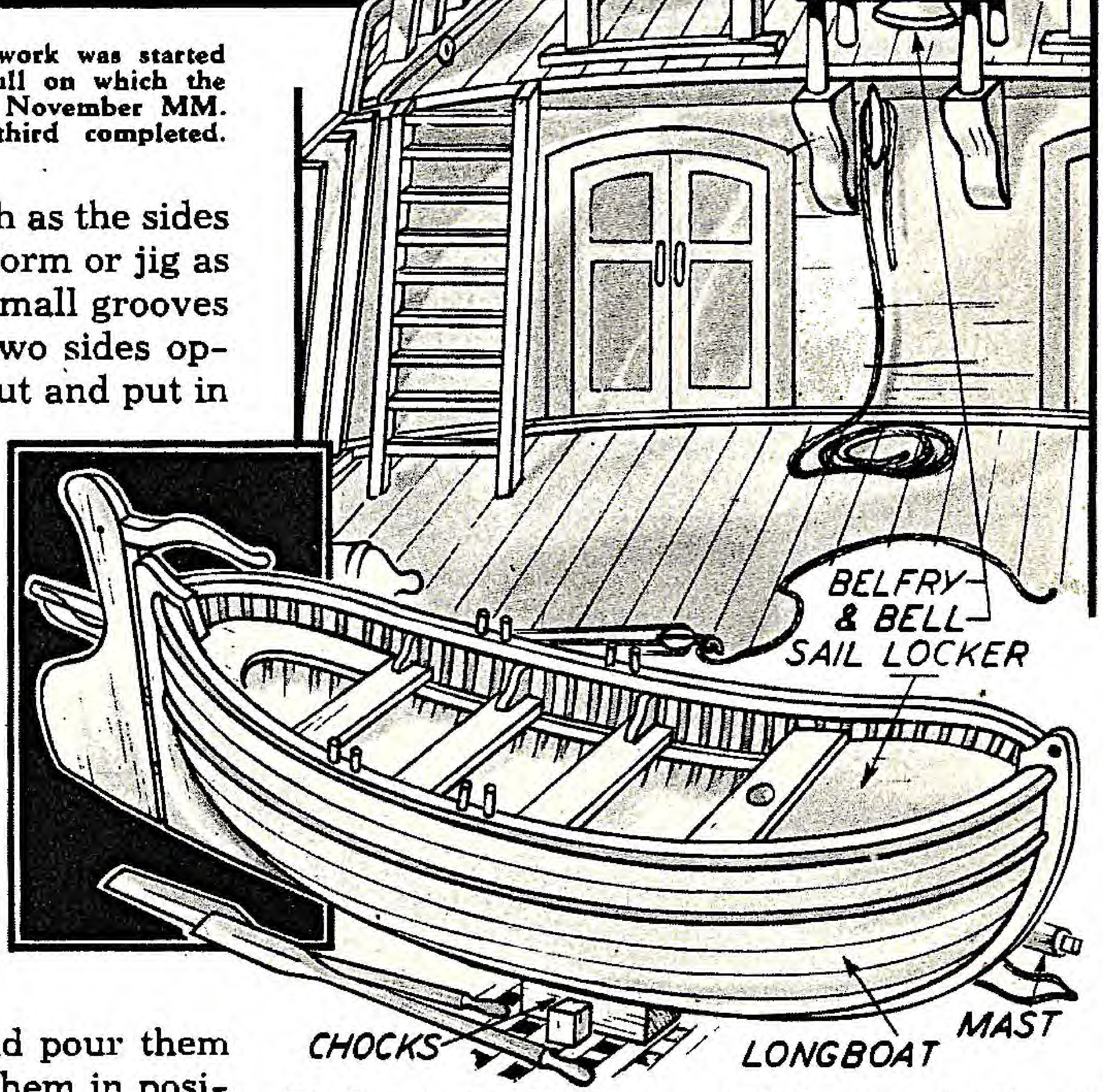
Dimensions for all masts and halyards appear here. Birch dowels are reccommended for making these as they are less apt to snap off. Rigging designations appear at left. Minion and Two-Saker guns are hardwood, turned.

holes. When they are all set in place, glue on the rail. For these birch, gumwood, pine, rattan cane or any straight grained wood serves very well. In order to make the lower rail properly, bend each rail where it turns down to meet the lower rail, steam or soak the ends in boiling water. Cut out at the bottom edge, at the point of the bend, a small triangular piece. Now glue into place. To facilitate the gluing process, spring clothes pins serve as good clamps to hold the rails in place. Otherwise, they can be tied with thread, it being removed later. Cut the hand rails and pin rails on the half, poop, and forecastle decks. Set on top of the posts in same manner as the belfry roof was fastened. There is also a fife rail behind the hatch, aft of the mizzen mast. This takes care of all the rails. If you are new at model making, you may look at the ladders with doubt, but don't worry, they're easy.

First, cut the side pieces, about the same size you made the railings. The



The rough decking is shown here before work was started on the cabin. The construction of the hull on which the unfinished deck sets was described in the November MM. At this stage the model is about one-third completed.



The Longboat and Belfry are two of the accessories that add much to the ship's beauty. No dimensions needed for these.

strips for the steps the same width as the sides but thinner. Now make a little form or jig as shown in the diagrams. Cut the small grooves with a scroll saw, then set the two sides opposite each other in the jig and cut and put in each step separately. They will be held by gluing. Give them ample time to set in the jig, then remove and clean up with fine sandpaper and small files.

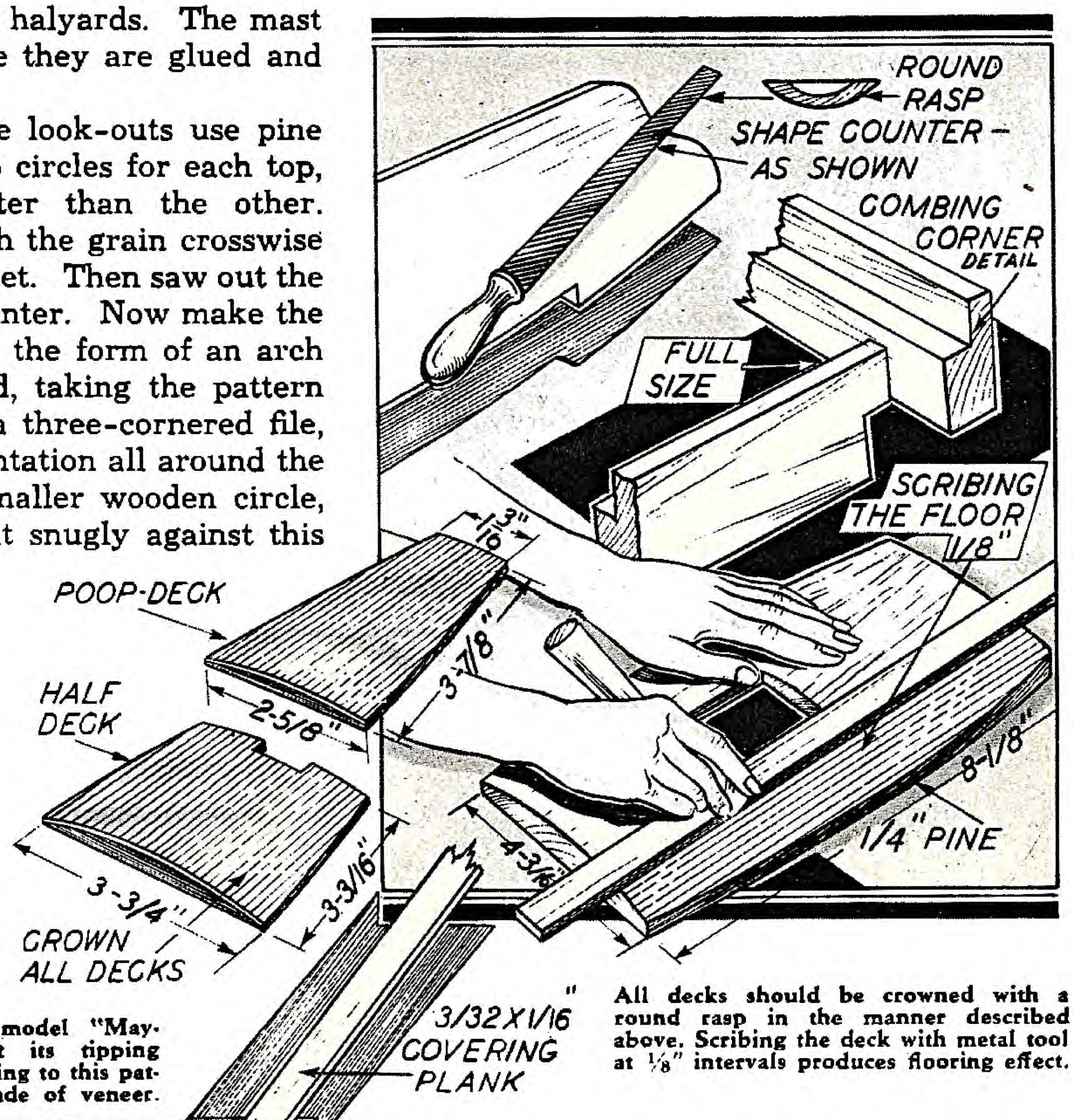
Next, there will be needed a number of cleats for belaying ropes. They can be made, very nicely, from boxwood, gumwood or birch veneer, these being better woods than pine for really small parts, because of the closer grain. You can also make a pattern and pour them in lead or white metal. Attach them in position with a pin and glue.

In making the capstan, a lathe will be of help. First turn the capstan, then groove the fluted part with a sharp knife or small chisel. If you do not have a lathe, you can make it by hand with a penknife, file and chisel from a thread spool. To go with the capstan, make two tapered poles 1⅛ in. long. These were used to turn the capstan for hoisting the anchors and hauling ropes and heavy parts. When not in use they were hung on racks in the bulwarks. Aft of the mizzen mast, there is a small hatch used as a speaking tube to the steersmen. Make this of red fibre or cardboard with three small square holes for grating. Make a similar hatch for the forecastle deck, drilling two small holes in the cover of this to reeve the halyards through.

Considering the guns, we have eight; four on each side firing a four-pound ball. Those on the main deck and at the stern are two sakers, a lighter and smaller gun. The gun carriages are made as shown in the drawings and held from bounding out of place by the gun tackle. The wheels for the gun carriages can be made by sawing thin pieces off the end of a dowel pin. The gun barrel can be made on a lathe from brass or hardwood. Note that the guns are devoid of numerous flanges and are smooth on the outside. The guns of this period being quite plain. Set the guns on deck, fitting the carriages with blocks. Reeve the blocks with cord after the painting.

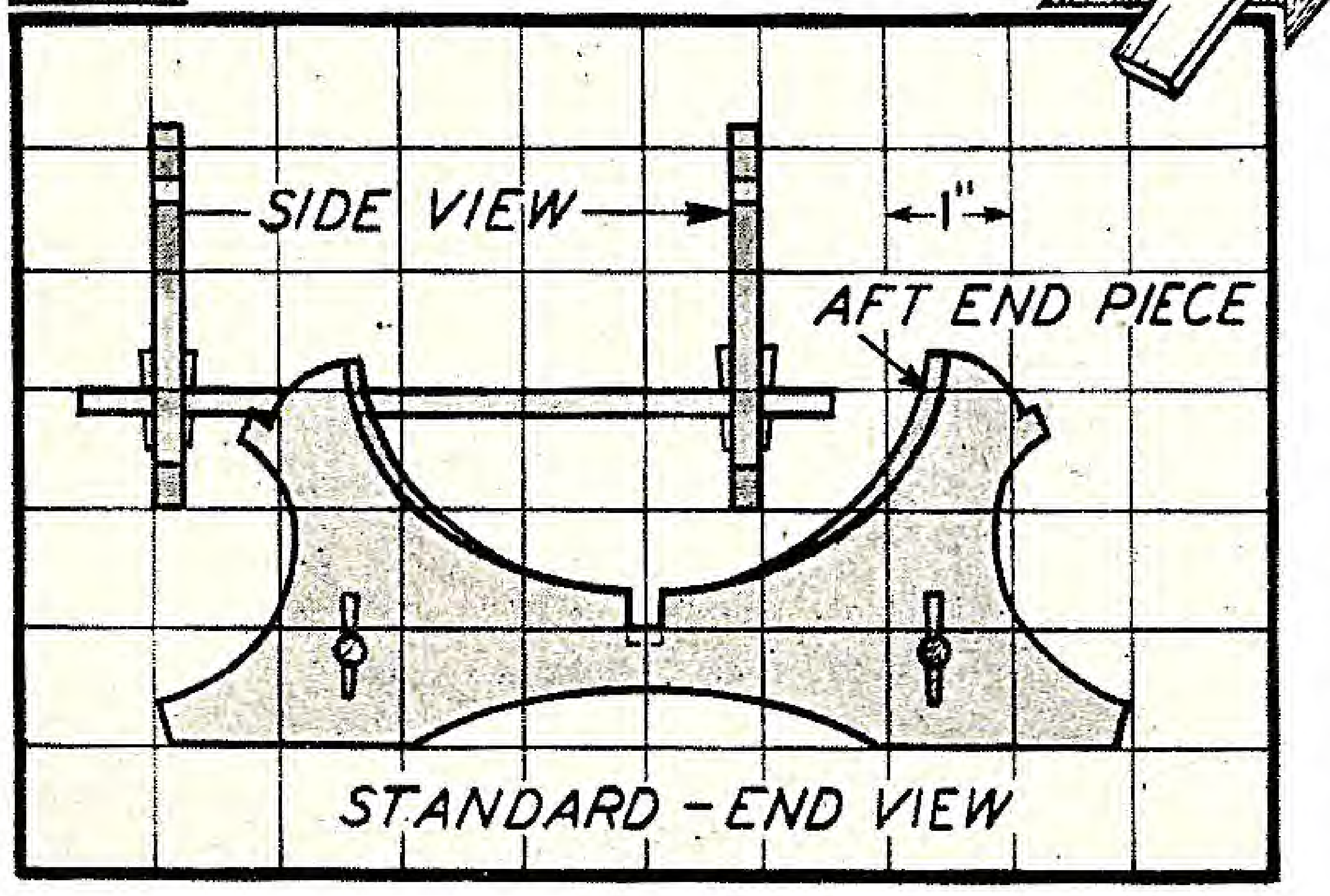
Make the window and door frames next. Cut these out of fibre board and glue into place. When these are done, construct the masts, yards, bow sprits and flag poles. Birch dowel sticks are best for these, and for the cheeks and caps. Pine is suitable for the cross trees which should be just far enough apart to fit the heel of the top masts. Underneath steadying the cross trees are cheeks. Holes are drilled through these in a fore and aft direction to take the halyards. The mast must be flattened where they are glued and nailed in position.

For the bottom of the look-outs use pine $\frac{1}{16}$ inch thick. Saw two circles for each top, one of smaller diameter than the other. Glue these together with the grain crosswise and put in clamps until set. Then saw out the lubbers hole near the center. Now make the sides of the look-out in the form of an arch from fibre or cardboard, taking the pattern from the plans. With a three-cornered file, rasp out a slanting indentation all around the circumference of the smaller wooden circle, so that the sides will fit snugly against this piece. The sides will slant outward toward the top. With the sides glued in place, make the circular top out of the same material and glue this on the top of the sides. Put some small weights on top to hold in place.



All decks should be crowned with a round rasp in the manner described above. Scribing the deck with metal tool at 1/8" intervals produces flooring effect.

A cradle for your model "Mayflower" will prevent its tipping over. It is cut according to this pattern from a good grade of veneer.



Glue small perpendicular strips of wood at equal intervals all around the sides of the top to represent strengthening timbers. Make the cross trees next, keeping them to scale. If you make these cross tree timbers too heavy, the finished product will appear very clumsy. Square the top of the lower masts to fit between the cross trees and up through the lubbers hole. Note that the cap has a square hole for the lower mast and a round hole for the top mast. After assembling these parts, make the small cross trees for the top masts and mizzen; also the caps and the flagpole, fitting the flagpole with a small wooden cap or bead. Here is the table of measurements for all masts and spars:

DIMENSIONS OF SPARS IN INCHES

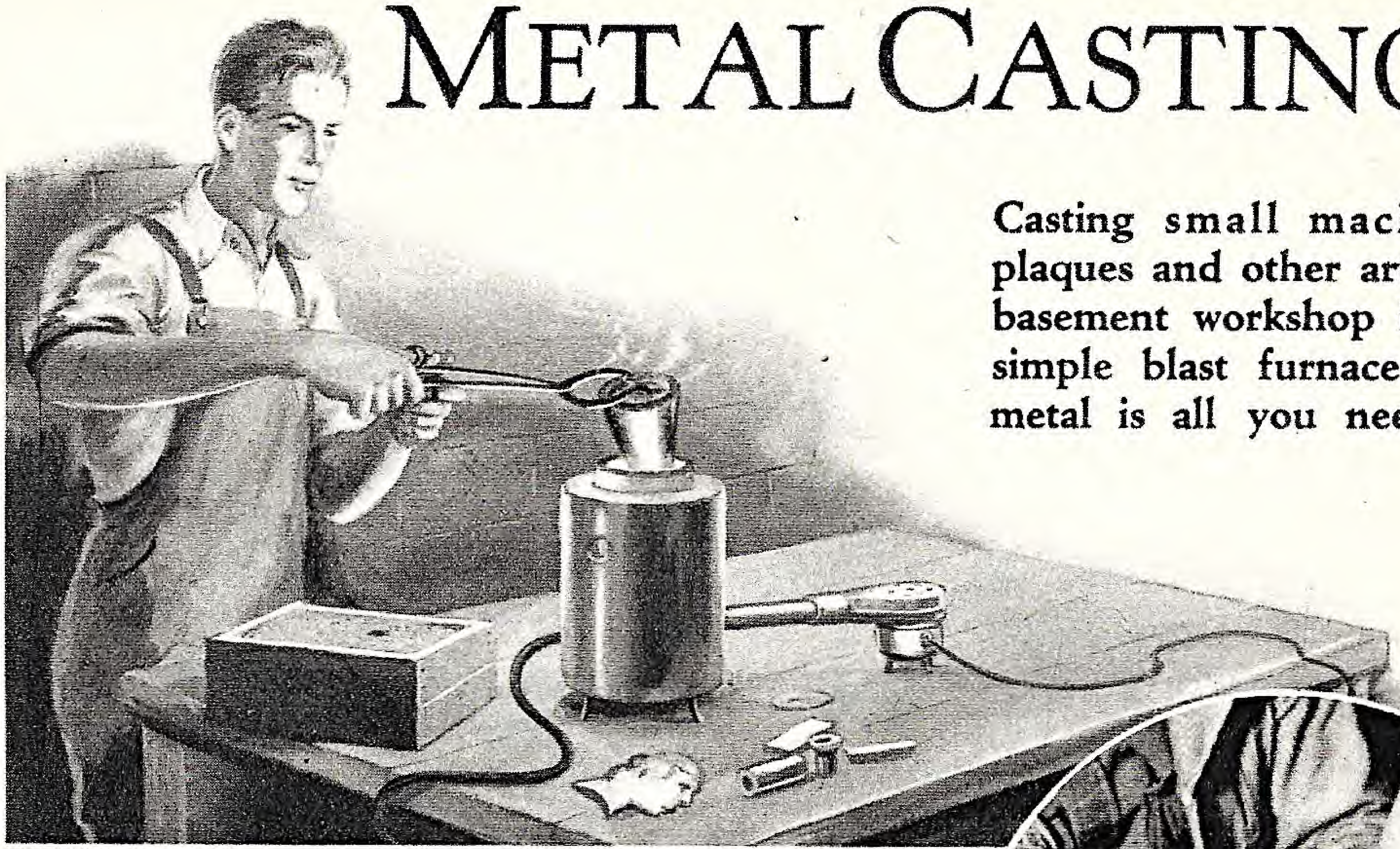
Mainmast	5/16" by 8½"
Fore mast	¼" by 6"
Mizzenmast	3/16" by 6"
Main top mast	¼" by 6¼"
Fore top mast	¼" by 5"
Bowsprit	¼" by 7½"
Flagpoles	1/16" by 2¾"
Main yard	3/16" by 9¾"
Fore yard	5/32" by 7¾"
Main topsail yard	⅛" by 4¾"
Fore topsail yard	3/32" by 3¾"
Sprit sail yard	⅛" by 5¾"
Mizzen yard	⅛" by 8⅝"

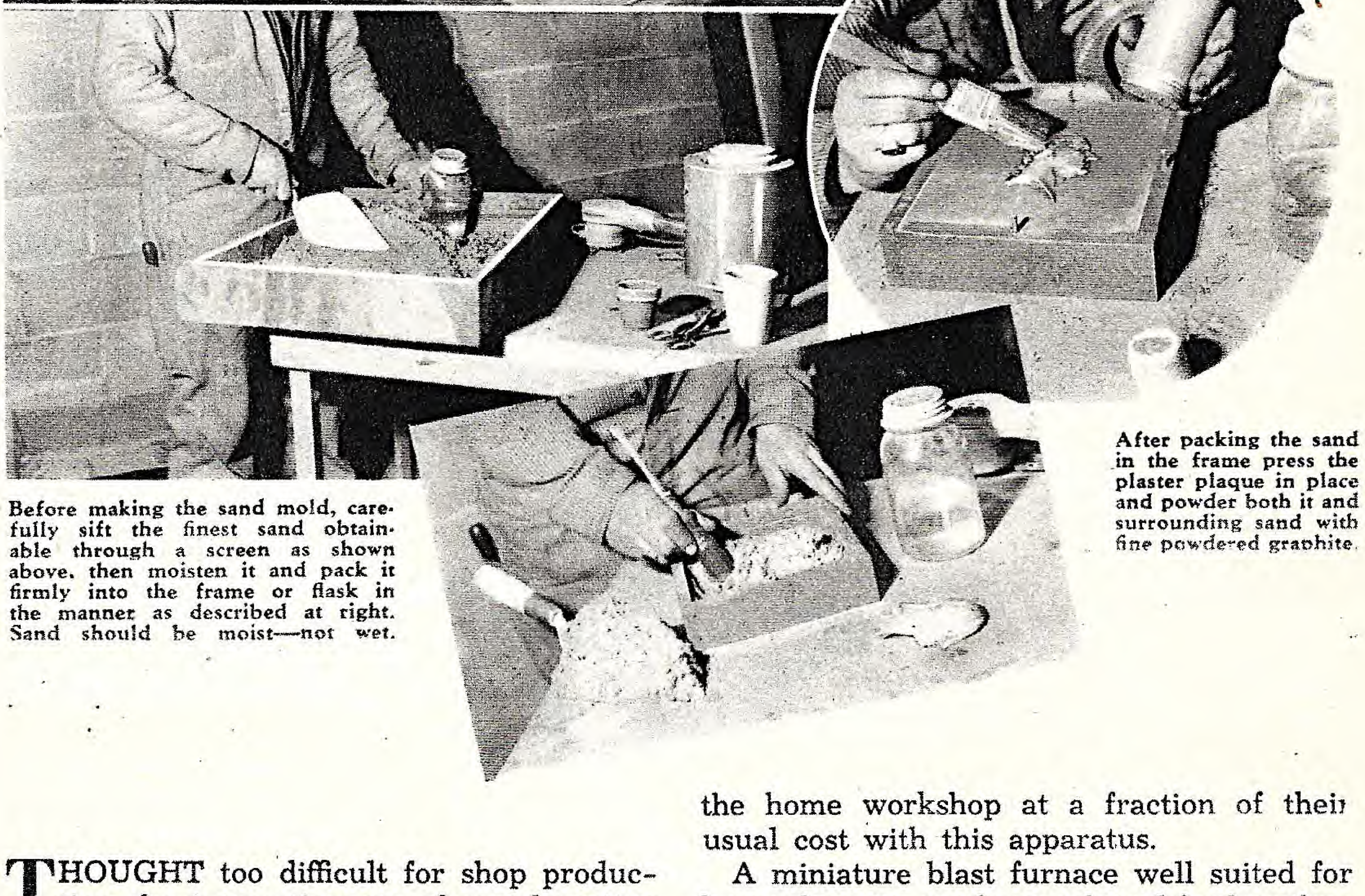
When all these parts have been made, they may be fitted together and the completed masts stepped into place. To do this, fit a stout wire in the end of the main mast. Drill

[*Continued on page* 128]

METAL CASTING IN

Casting small machine parts, plaques and other articles in the basement workshop is easy. A simple blast furnace and scrap metal is all you need to start.





Before making the sand mold, carefully sift the finest sand obtainable through a screen as shown above, then moisten it and pack it firmly into the frame or flask in the manner as described at right. Sand should be moist—not wet.

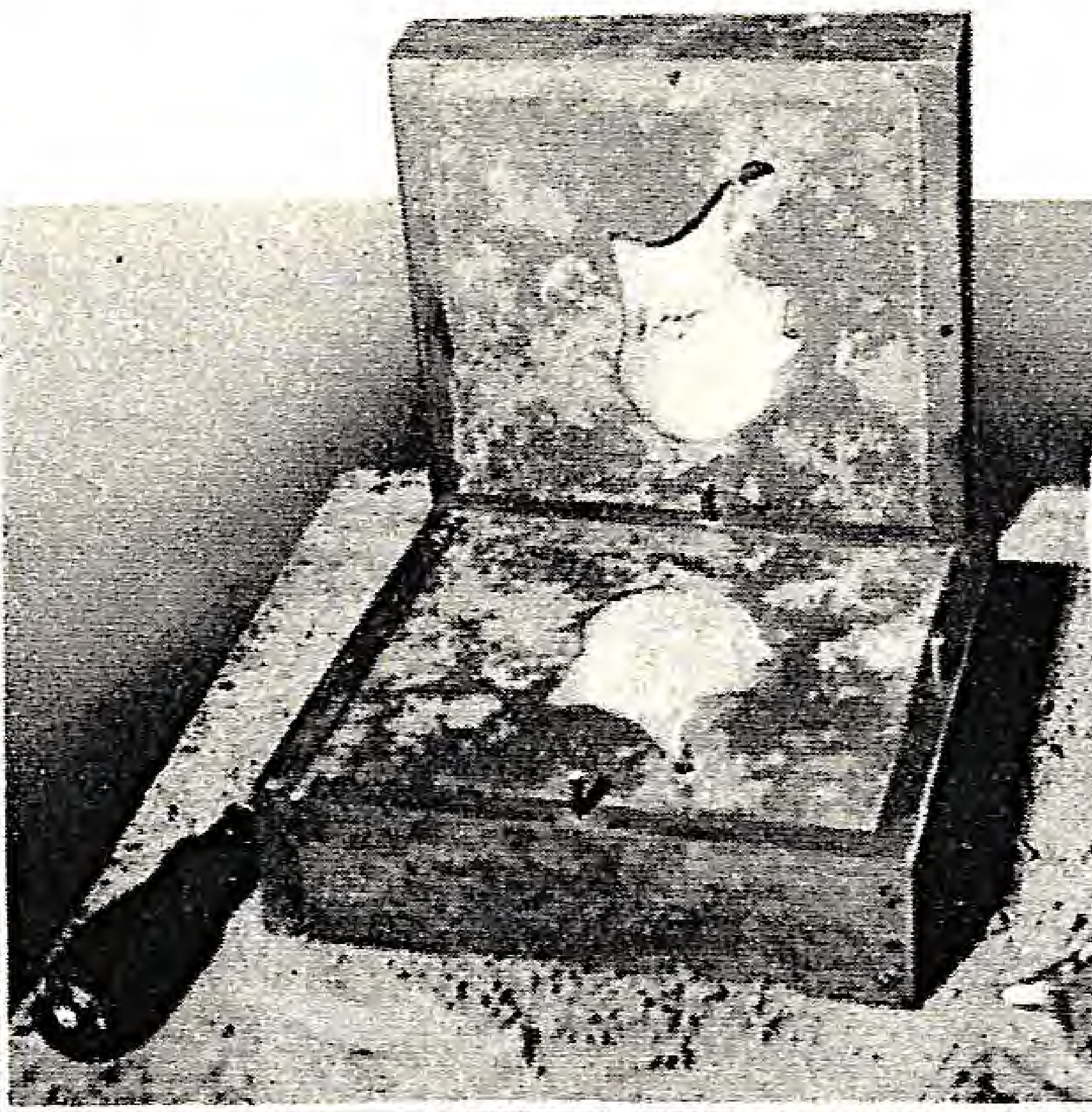
After packing the sand in the frame press the plaster plaque in place and powder both it and surrounding sand with fine powdered graphite.

THOUGHT too difficult for shop production the interesting art of metal casting has been passed up by many shopmen and home craftsmen who did not realize that this craft was really simple after its procedure had been studied. Using any of the popular soft metals and plaster of Paris wall plaques such as sold in ten-cent stores anyone, with a little practice, can make perfect reproductions of these articles in bronze or aluminum. The finished articles make attractive gifts as well as decorations for use in your own home. Small parts for models, machine bushings and light hardware can also be duplicated in the home workshop at a fraction of their usual cost with this apparatus.

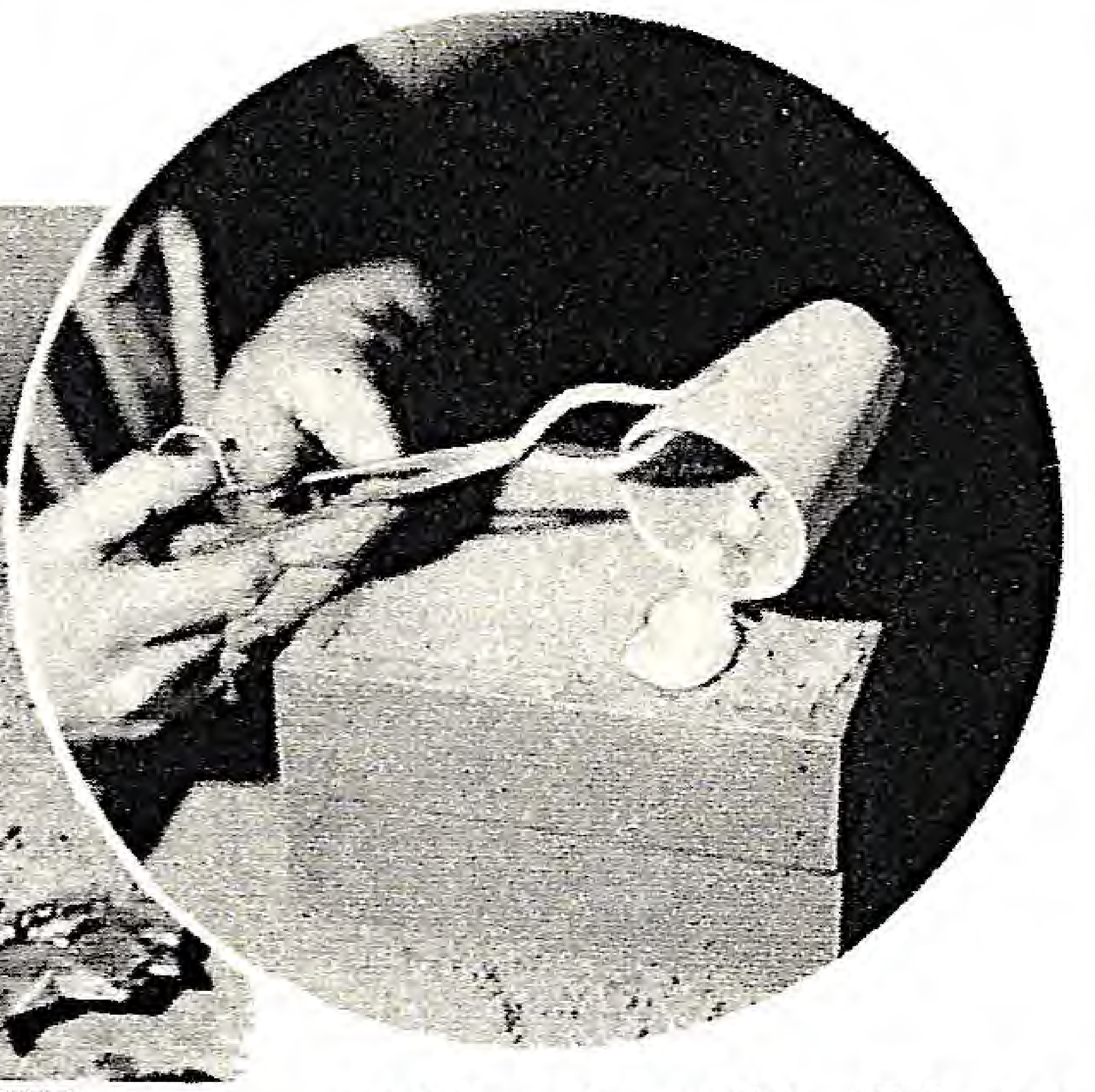
A miniature blast furnace well suited for home shop use can be purchased for less than twenty dollars. Operated by a light electric powered blower and a gas flame the furnace will handle up to six cubic inches of molten metal. It is unnecessary to use new metal for casting light articles since scrap metal melted over is just as good and costs only about ten cents a pound from junk dealers.

After completing your furnace set-up preparation of the molds can be undertaken. These are made from very fine sand which has been screened to remove all lumps, then

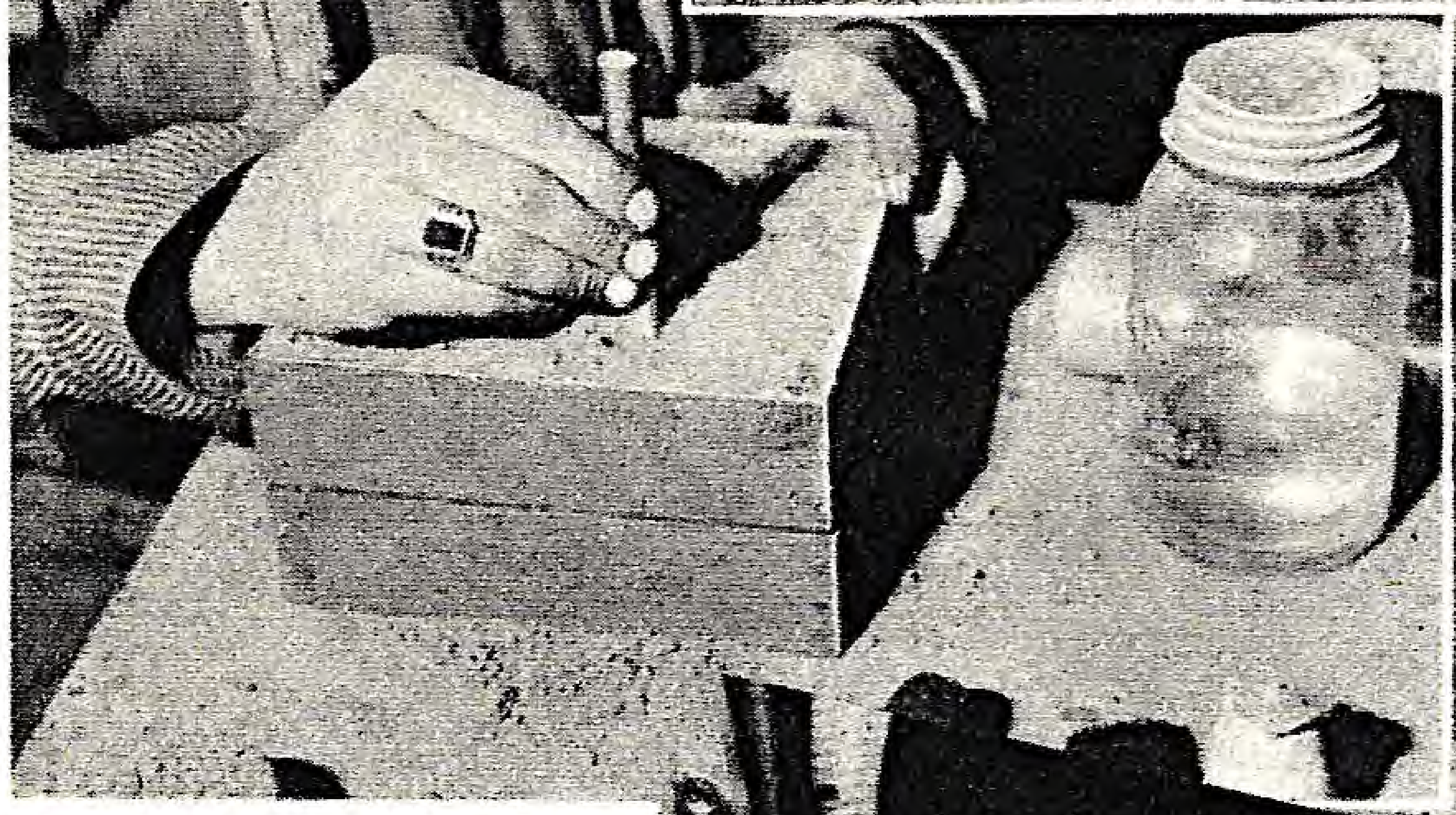
ALUMINUM AND BRONZE



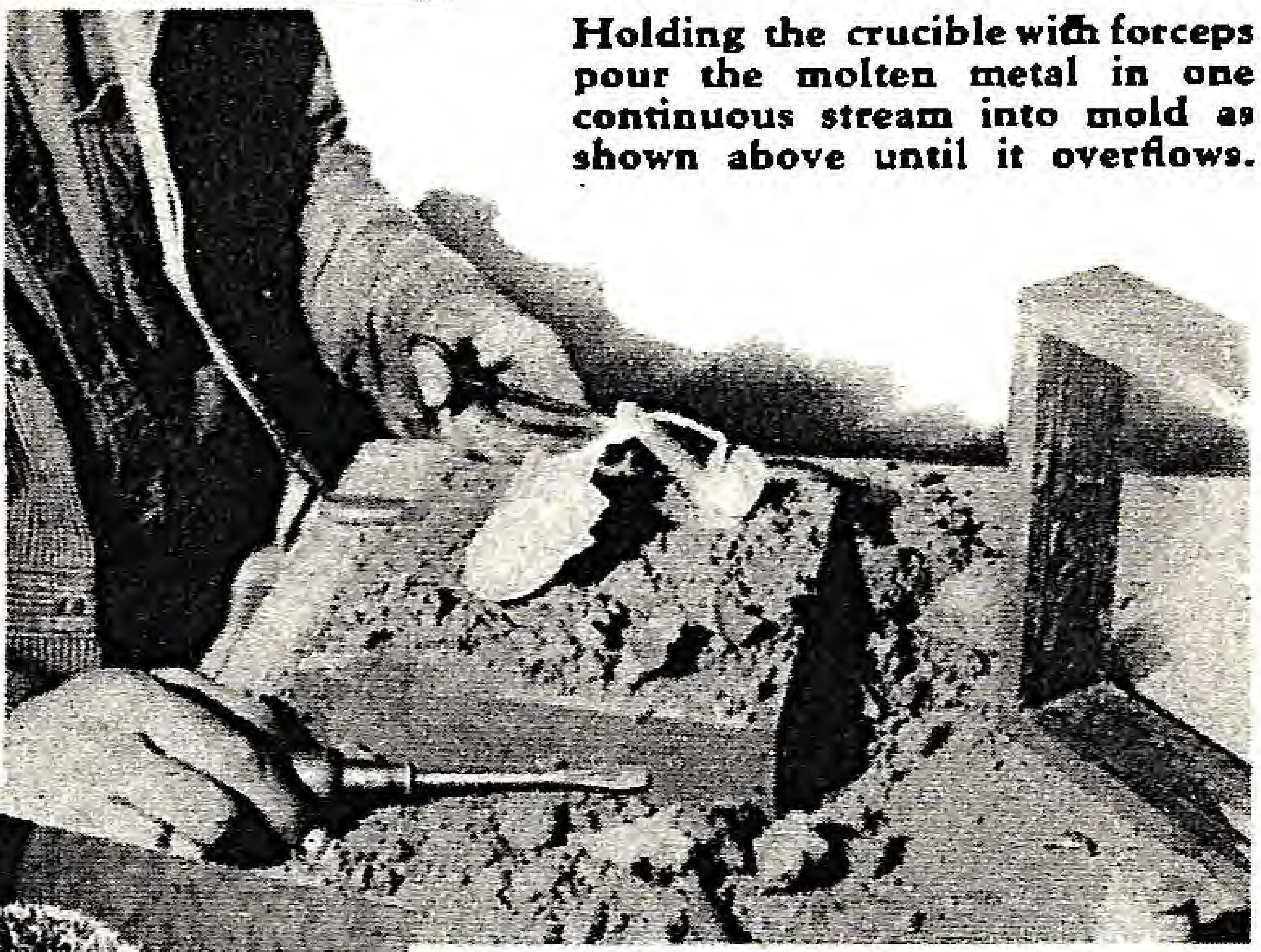
Completing the graphite powdering, place the upper frame over lower and pack it with sand. Frames are carefully separated and plaque removed as shown at right.



Holding the crucible with forceps pour the molten metal in one continuous stream into mold as shown above until it overflows.



In order to pour the metal into the mold a well is required. Wood dowel provides this.



After the metal has been allowed to cool, the sand mold is broken apart and the rough casting removed. Above is shown the casting before surplus metal was cut off. This is done with a back saw and several sizes of files.

After the casting has hardened it is removed, rough parts filed down and the surface is polished on a buffing wheel.

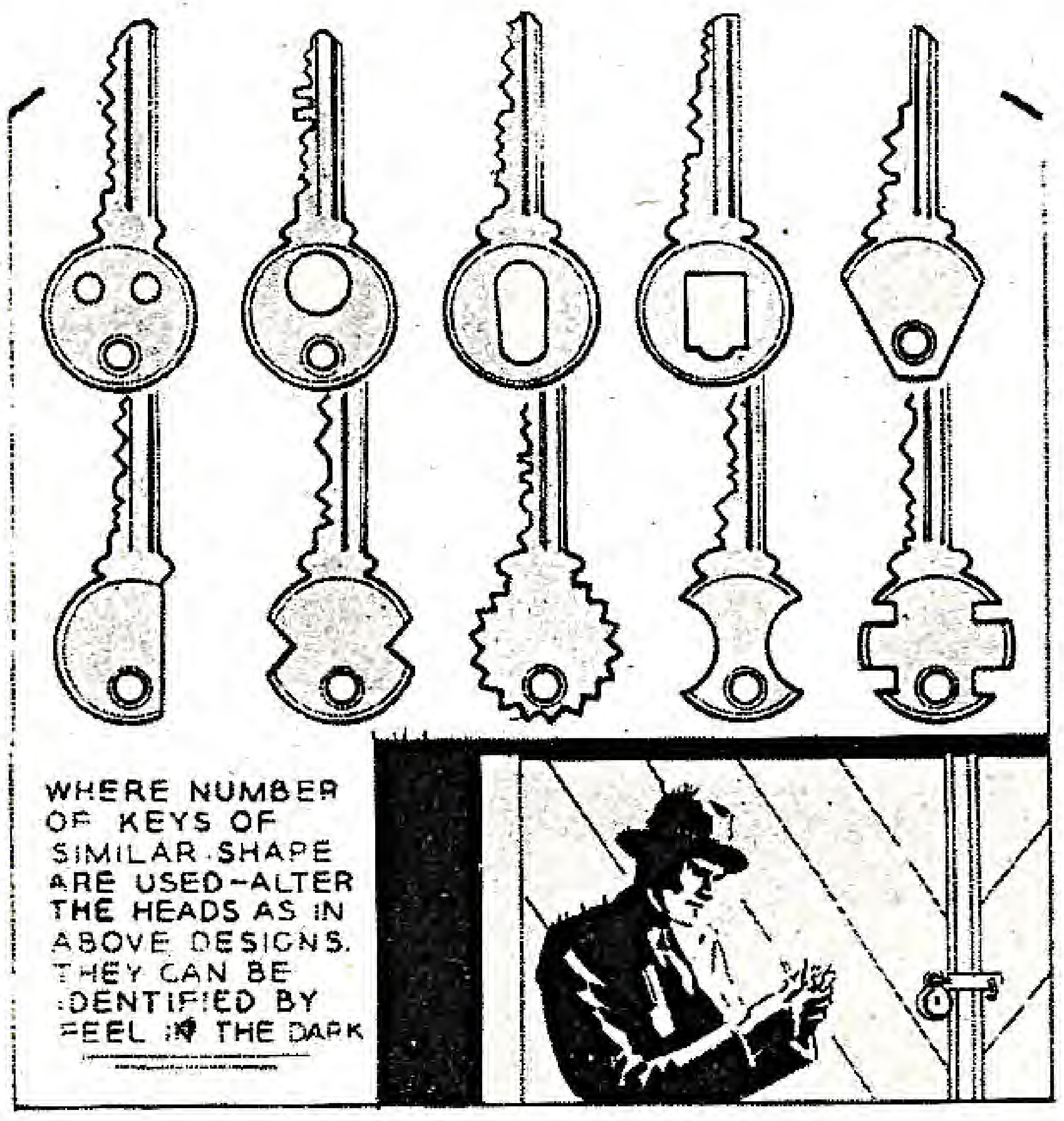
moistened with water and mixed with a trowel until when squeezed in the fingers the fingerprints show in the sand. Pack the moist sand into the flask taking care that the sand is packed well in all corners. The flask is a pair of box-like frames which rest one on top of the other with small dowel pins provided so that they register properly. Grooves cut inside the frame prevent the sand from dropping out once it has been packed in. The accompanying illustrations show the simplicity of their construction.

With the sand packed in one frame or flask the pattern is ready for impression. In this case a plaque of George Washington was selected and placed face up in the center of the sand mold. Next press the plaque firmly into the sand until all edges touch evenly. Sprinkle powdered graphite or talcum powder over both the surface of the sand and plaster plaque wiping off carefully all surplus.

The top half of the frame or flask is then put into place and sand sprinkled lightly over the graphited surface by passing it through a

[*Continued on page* 122]

KINKS THAT SIMPLIFY HOME PROBLEMS

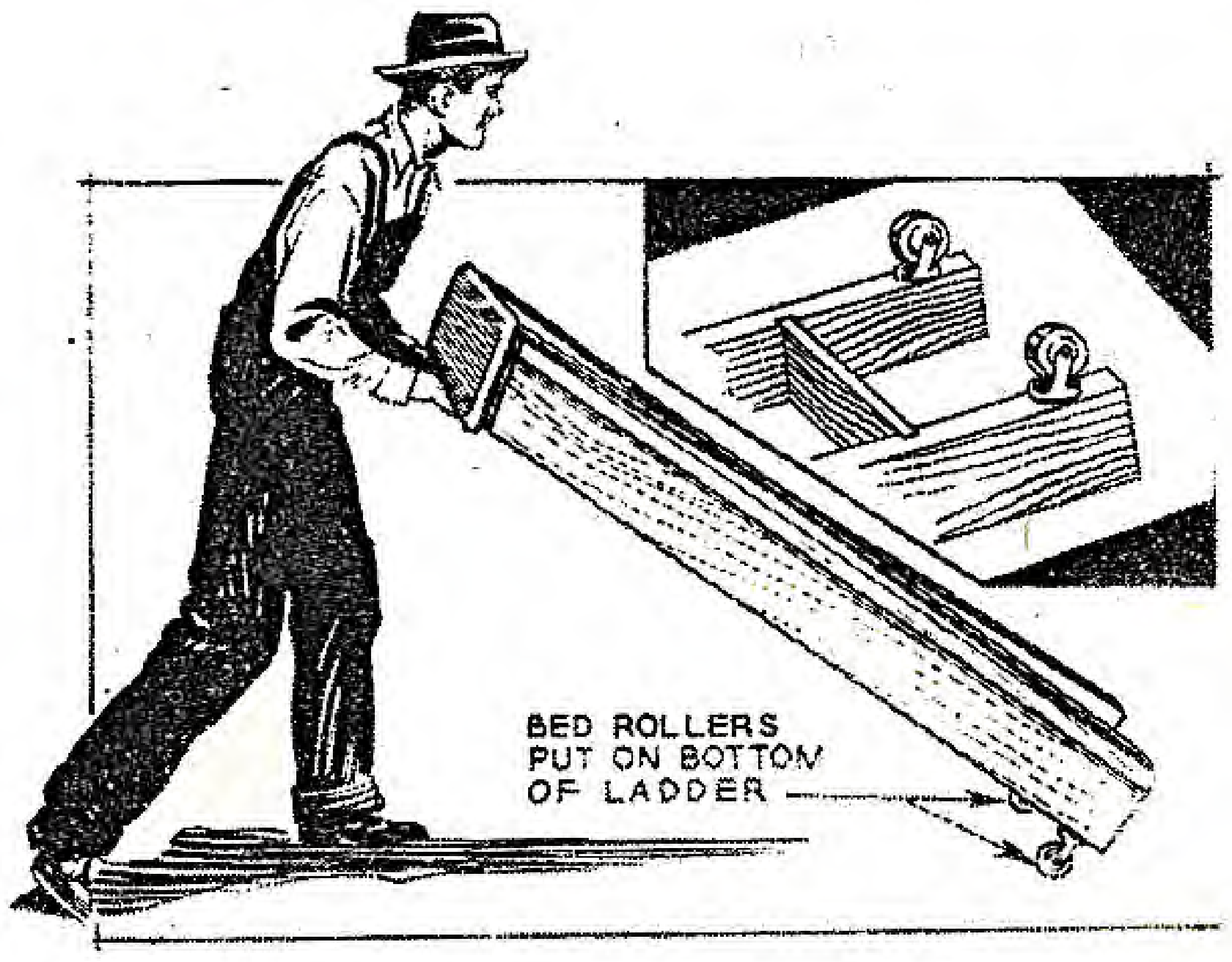

WHERE NUMBER OF KEYS OF SIMILAR SHAPE ARE USED—ALTER THE HEADS AS IN ABOVE DESIGNS. THEY CAN BE IDENTIFIED BY FEEL IN THE DARK

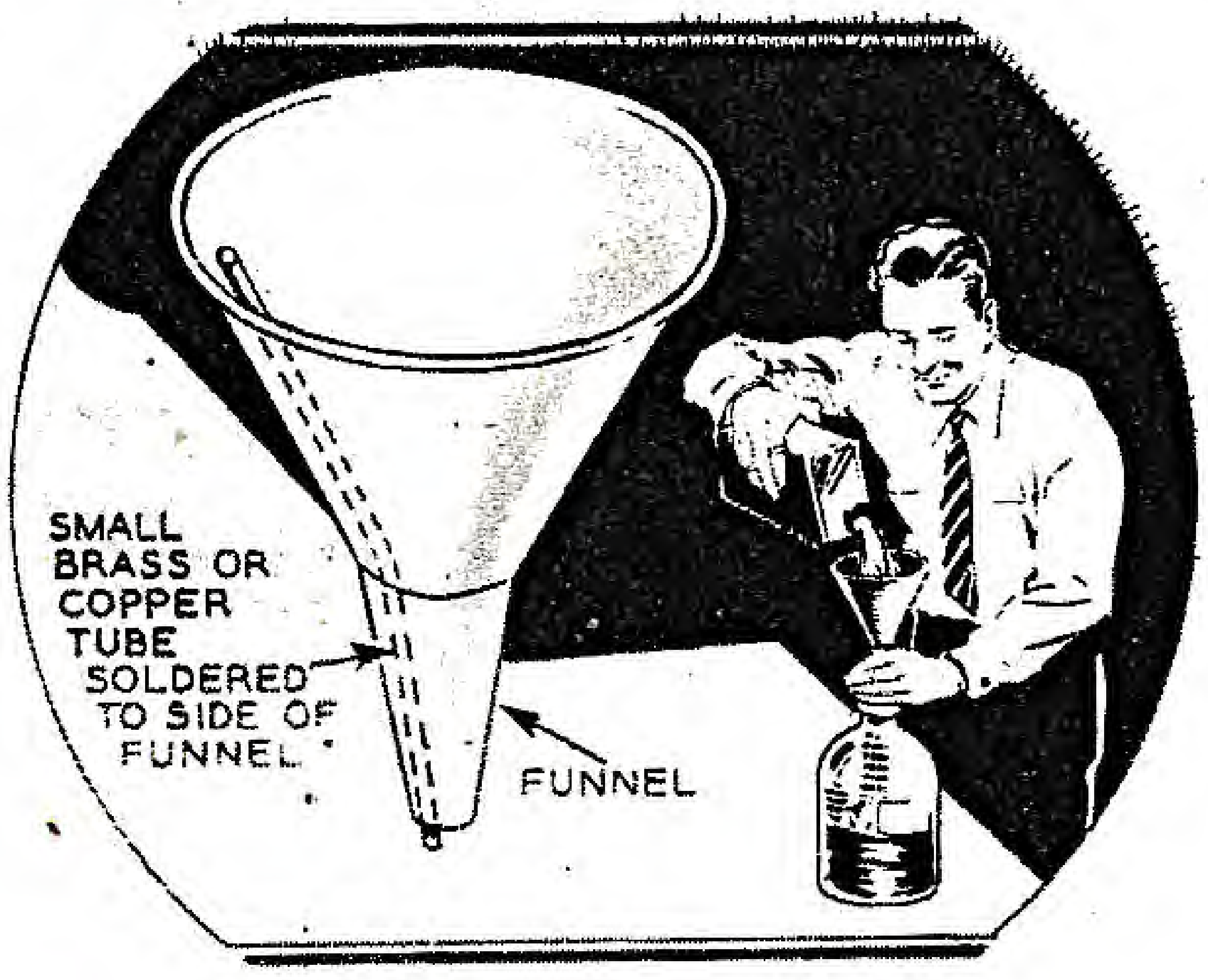
Slots Identify Keys In Dark

LOCATING the proper key in the dark is no easy task especially if you have a number of keys in your holder. By drilling and notching house, auto and locker keys with identification slots the correct key can be located at once. If a drill press is handy quarter-inch holes may be drilled in the key disc; one hole in the house key, two holes in the garage key and so on. If a number of keys are carried slots can be cut or filed in the edges to identify them. In making holes in the disc place them as far from the key ring hole as possible so as to avoid confusion.—Andrew Vena, New York, N. Y.

Casters Simplify Moving Of Ladders

A PAIR of furniture or bed casters placed at the bottom of a step ladder will simplify its moving from one room to another. Drill holes in the upright planks large enough for the rollers to be forced in. Do not make the holes too small, otherwise they may cause the wood to split. After the completion of a task, fold up the ladder and roll it as you would a vacuum cleaner into the next room.—A. H. Waychoff, Tempe, Arizona.


BED ROLLERS PUT ON BOTTOM OF LADDER

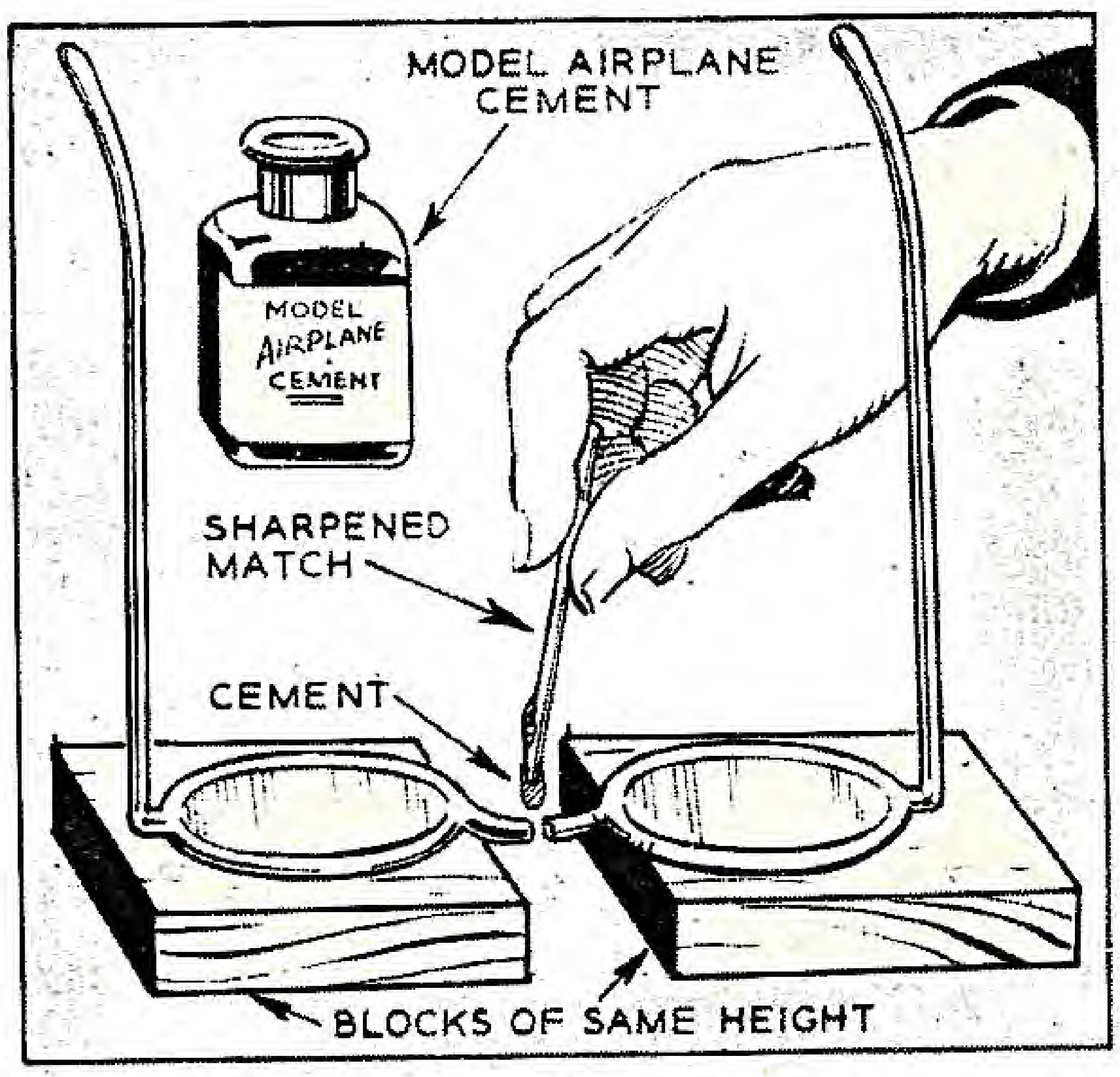

SMALL BRASS OR COPPER TUBE SOLDERED TO SIDE OF FUNNEL
FUNNEL

Air Tube In Funnel Prevents Overflow

WHEN liquids are to be poured into a narrow necked container there is always the problem of the funnel preventing air from escaping from the bottle. The result is that unless sufficient care is exercised the funnel will overflow and the liquid spill on the table. To avoid this difficulty solder a length of copper tubing inside the funnel with the tubing projecting slightly below the funnel spout. With the tubing in place any liquid can be poured without the danger of the funnel overflowing. —Morris A. Hall, White Plains, N. Y.

Airplane Cement Repairs Spectacle Frames

WHEN a spectacle frame snaps at the nose piece there is no need to throw the frame away or be without glasses. So long as the frame is of shell or celluloid composition it can be easily repaired with model airplane cement. Place the broken frames on two blocks of wood apply a drop of cement to each side of the broken section and allow it to dry. After a few minutes apply a second coat and stick the two pieces together. Allow the spectacle frame to remain untouched overnight in a warm dry place to speed setting. When thoroughly dried the cement will become part of the original frame. —Hi Sibley, Pasadena, Calif.


MODEL AIRPLANE CEMENT
MODEL AIRPLANE CEMENT
SHARPENED MATCH
CEMENT
BLOCKS OF SAME HEIGHT

For The Kiddies—A Wooden Bronco That Bucks

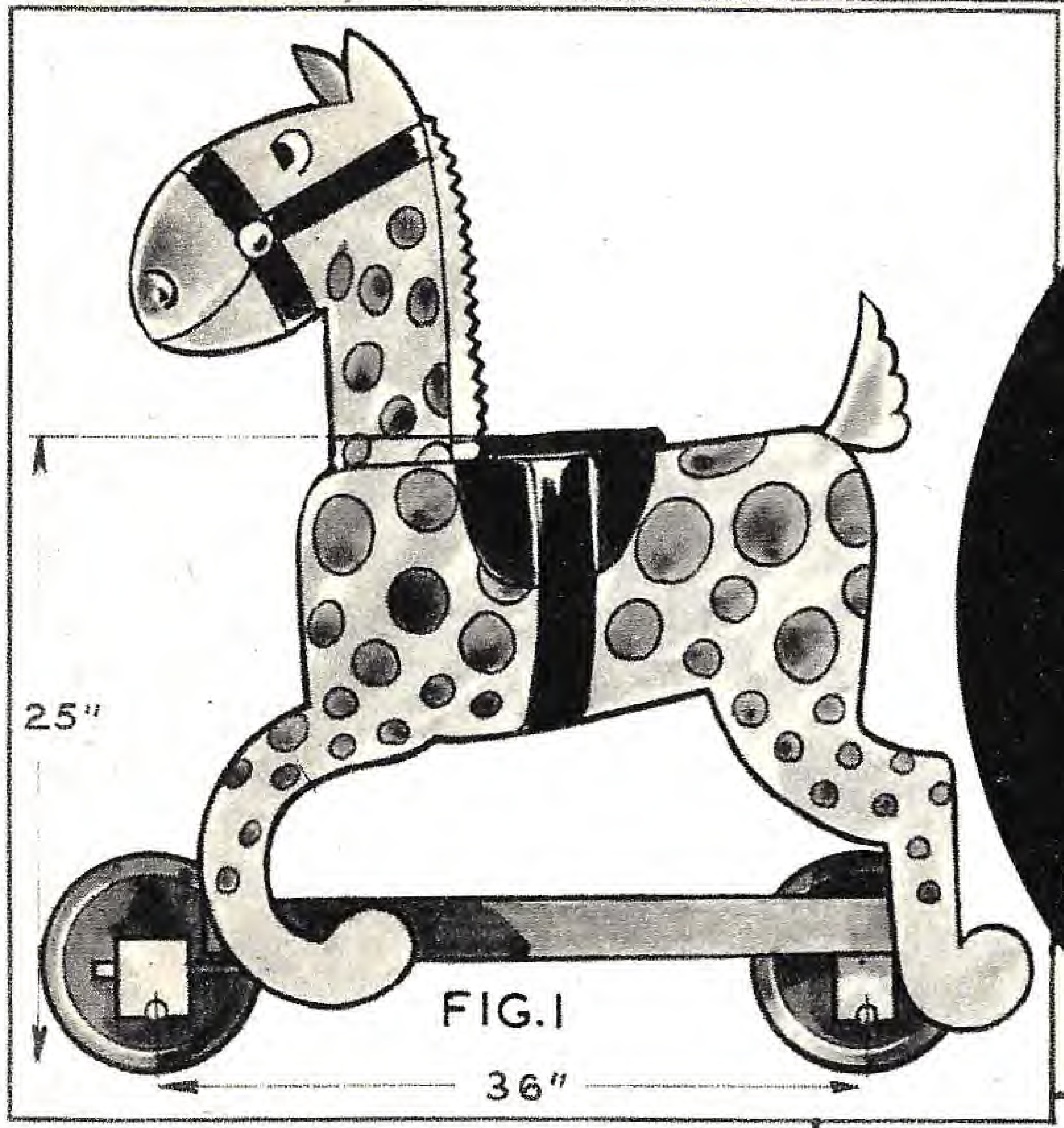
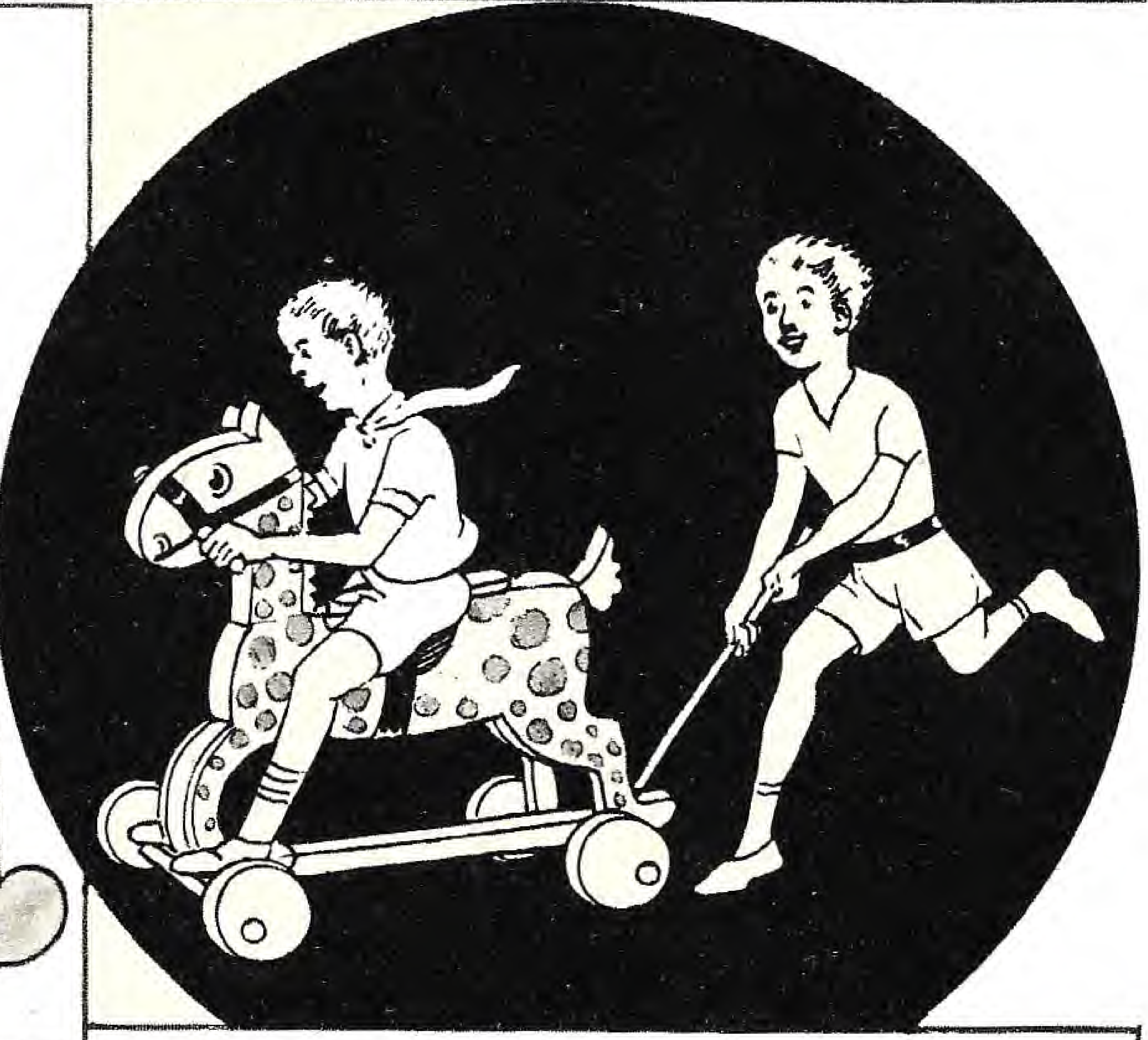


FIG. 1



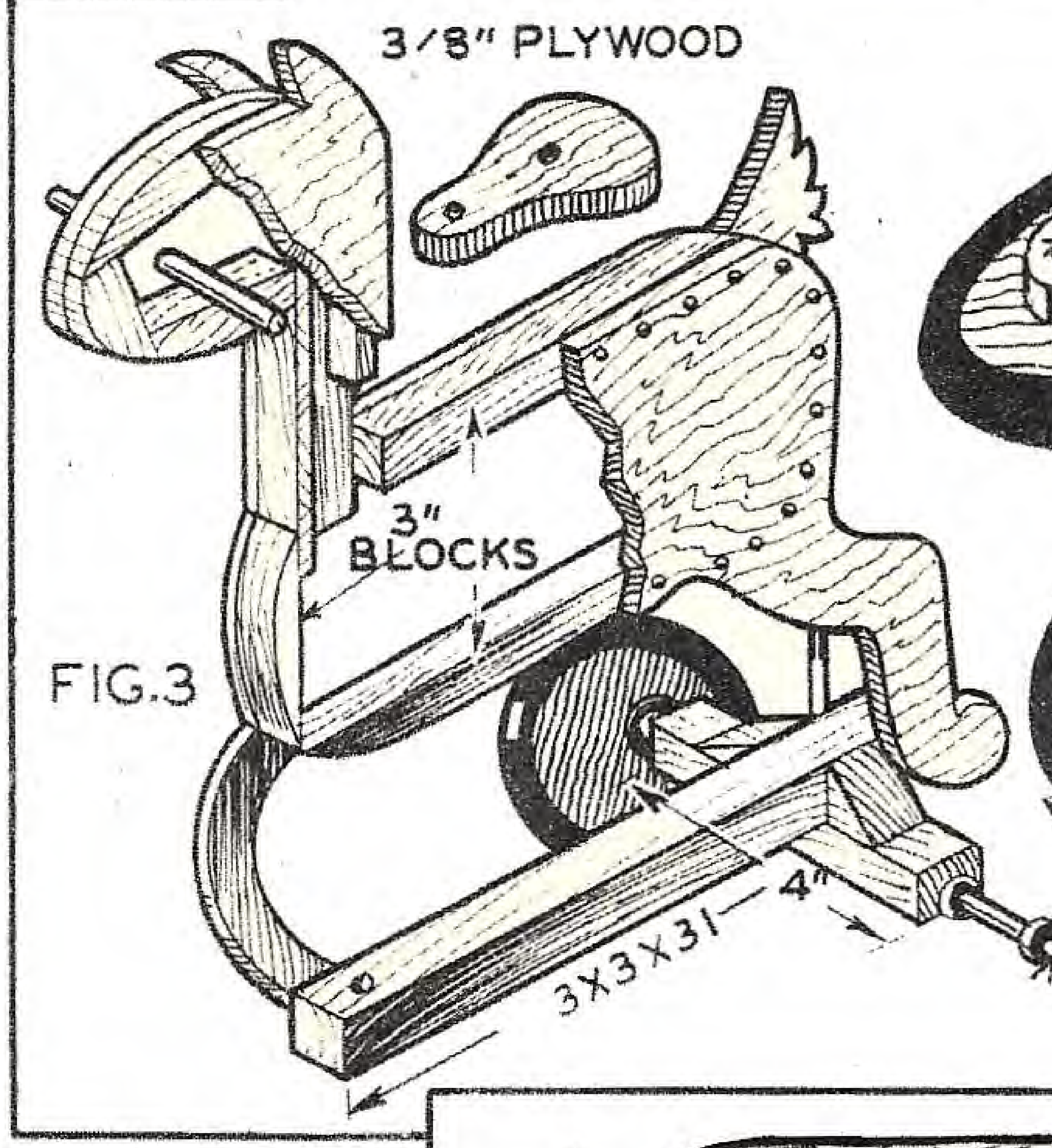


FIG. 3

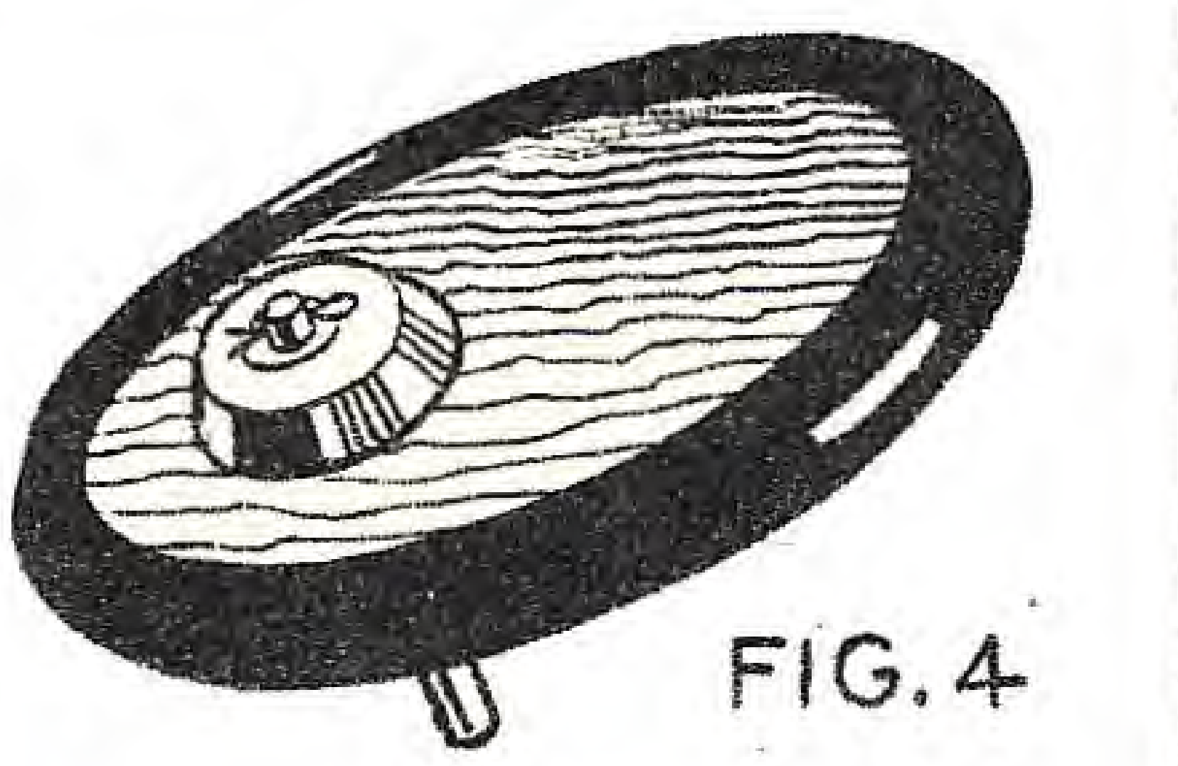


FIG. 4

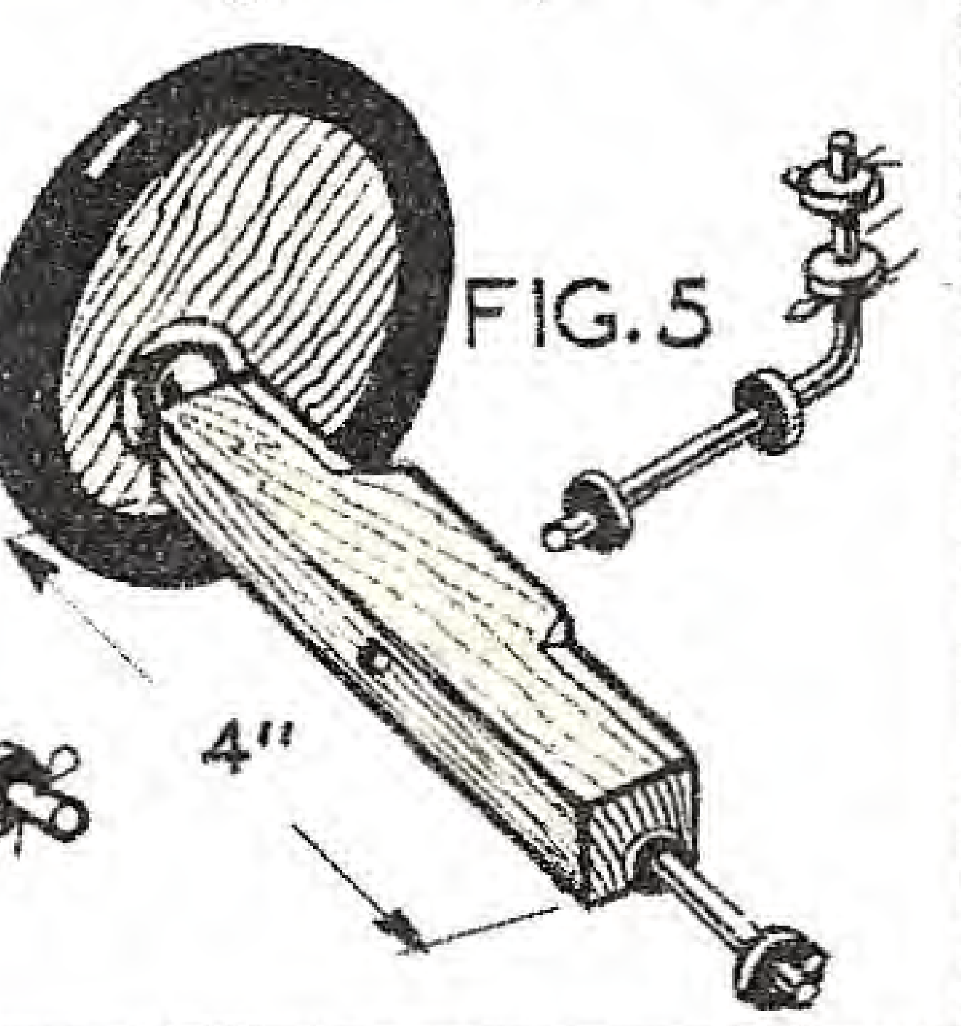


FIG. 5

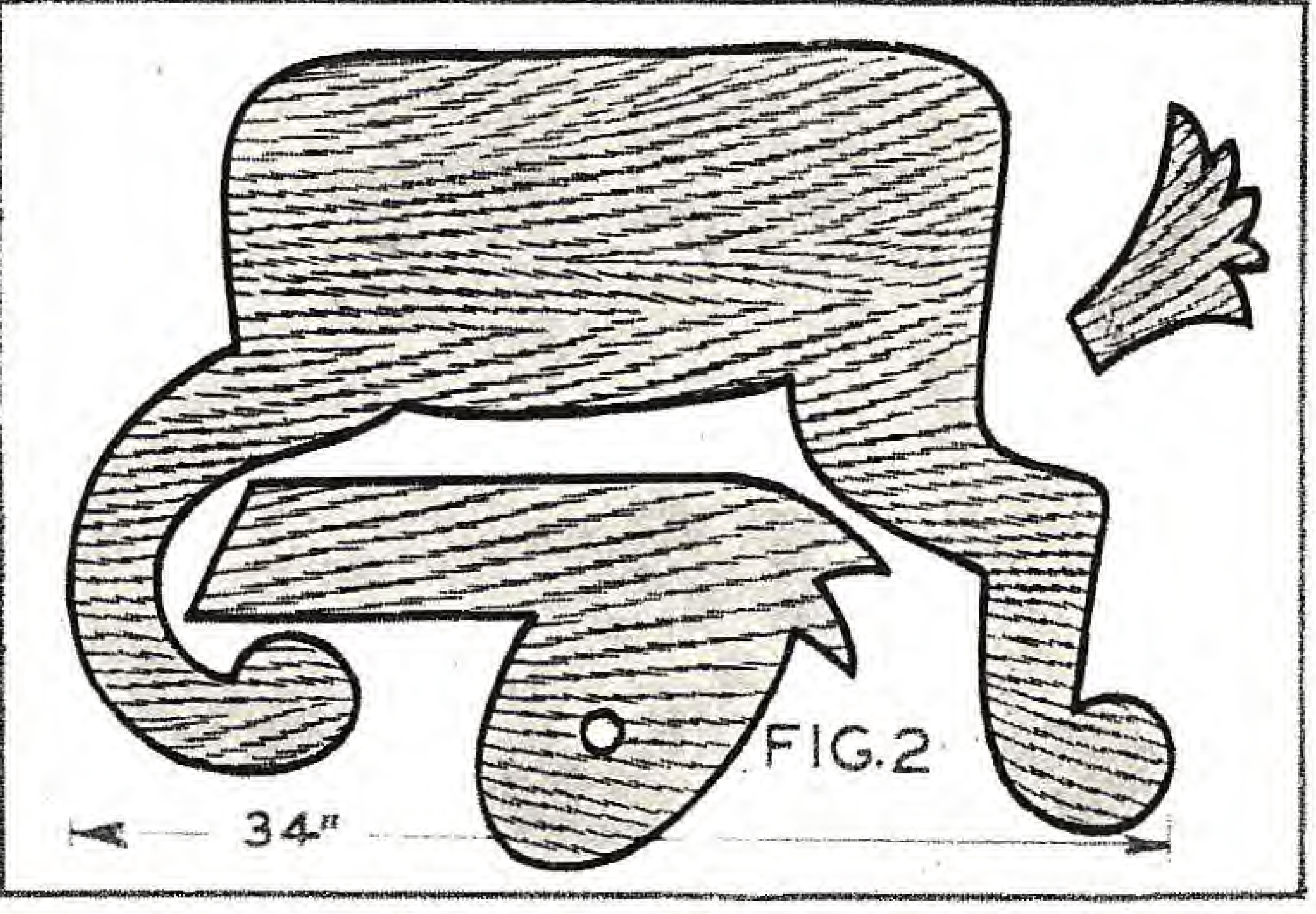


FIG. 2

What child won't thrill to ride this novel hobby horse. When pushed along the pavement the horse bucks like a bronco. The horse is constructed from wood sections assembled as shown at right. Off-center wheels provide the bucking effect. Due to the constant vibration assemble the horse with wood screws of sufficient length.

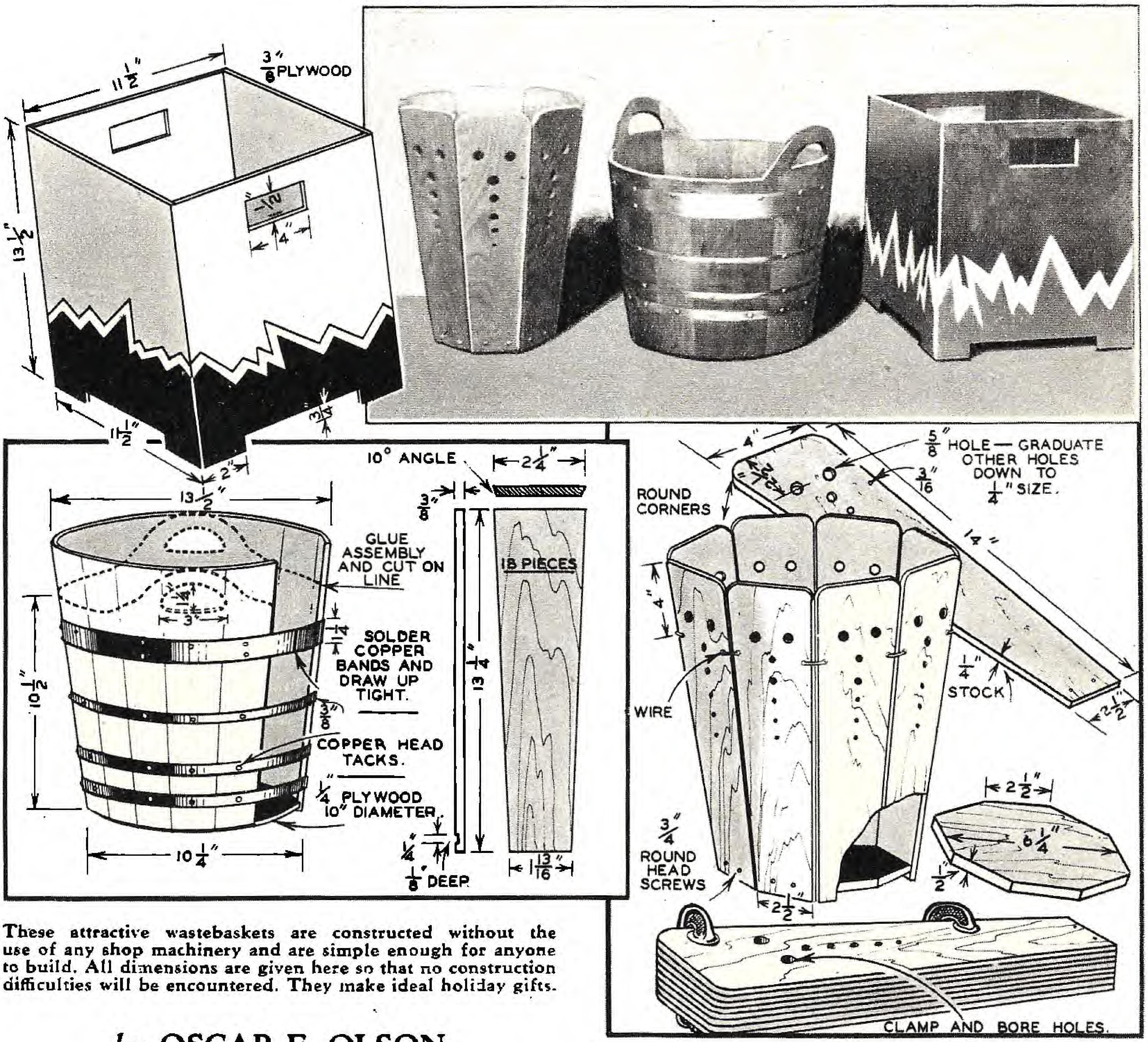
WITH this lively little bronco any child can stage his own rodeo and be reasonably sure he won't be thrown. The horse is mounted on four eccentric wheels and with the swiveling front axle, foot steered, all sorts of gaits may be expected.

Construction is really very simple for anyone equipped with a scroll saw and lathe. The body and head are cut from ⅜-inch plywood joined with spacer blocks, and mounted on a substantial base of 2 inches by 3 inches pine. The front axle is hung on a right-angled king pin, thus giving the chassis a three-point bearing no matter in what position the wheels are.

The wheels are made up of two 8-inch disks of ⅜-inch plywood glued together with casein glue and fitted with plywood hubs, as shown. The axle turns in a brass bushing set 1½ inches off center. The rim of the wheel should be trued on a lathe and turned concave to receive the solid rubber tire. Your bicycle repair man can set on the tires, as a proper job requires equipment to draw the center wire tight.

Mount a wood saddle on the horse's back, and give it a snappy paint job all over—a yellow ground with brown or black spots, red saddle and bridle, black hoofs and red wheel disks.

Wooden Wastebaskets of Distinctive Design


11½"
⅜" PLYWOOD
13½"
4"
½
11½"
¾
2"
13½"
10° ANGLE
2¼"
⅜"
GLUE ASSEMBLY AND CUT ON LINE
18 PIECES
3"
¼
¼
SOLDER COPPER BANDS AND DRAW UP TIGHT.
10½"
⅜"
13¼"
COPPER HEAD TACKS.
¼" PLYWOOD 10" DIAMETER.
10¼"
¼"
⅛" DEEP
1 13/16"
4"
2"
⅝" HOLE — GRADUATE OTHER HOLES DOWN TO ¼" SIZE.
3/16"
ROUND CORNERS
14"
4"
WIRE
¼" STOCK
2½"
2½"
6¼"
¾" ROUND HEAD SCREWS
½"
2½"
CLAMP AND BORE HOLES.

These attractive wastebaskets are constructed without the use of any shop machinery and are simple enough for anyone to build. All dimensions are given here so that no construction difficulties will be encountered. They make ideal holiday gifts.

by OSCAR E. OLSON

SINCE wastebaskets find a use in almost every home they are ideal projects for Christmas gifts and cost little to make. Made entirely of wood they are not only durable but distinctive in design. All three may be constructed with simple workbench tools if the builder does not possess shop machinery.

The square basket, in modern design, is the easiest of the group to construct. It is made of ⅜" plywood, and painted in bright contrasting colors, the layout of which is shown in the drawing.

The banded basket is designed for a Colonial setting, and is patterned after the Early American hand tub. When constructed of maple or birch, and finished in colonial brown, with copper bands, it makes an attractive piece. Cut eighteen staves of ⅜" stock to specifications shown in diagram. Be sure that all edge cuts are smooth, straight and of uniform angles. Saw out circular bottom board of ¼" stock and notch staves to fit. A tight fit of stave and bottom will aid in assembling, as each piece will stay in place. Glue sections in position and compensate for any variation by altering the last two staves to fit. Draw staves up tight with two rope twists and lock in position. Let stand until the glue has set. Plane down corners to bring outside surface even and round and sand to a smooth finish.

Use a string to determine the distance around the basket at the desired location for each band and lay out copper strips. Sweat-solder the ends together and tap in place. The upper edge of the band will stretch if

[*Continued on page* 120]

MORE
THRILLS
THAN EVER

with the **NEW 1937**

HARLEY-DAVIDSONS

What a wonderful line-up — those 1937 Harley-Davidsons! When you cast your eyes on their new lines, flashy new colors, built-in instrument panels, and 120 M.P.H. speedometer dial—you'll say they're the classiest outfits you ever saw! These 1937 Harley-Davidsons sure have improvements galore! New circulating pressure oiling—roller bearing motors—double loop trussed frames—welded steel saddle-type tanks. Longer motor life — increased gas and oil mileage — greater sustained horsepower — greater strength — easier handling. . . And, Boy! — when you ride one of these 1937 Harley-Davidsons you KNOW you're going places! See your nearest Harley-Davidson dealer *right away.*

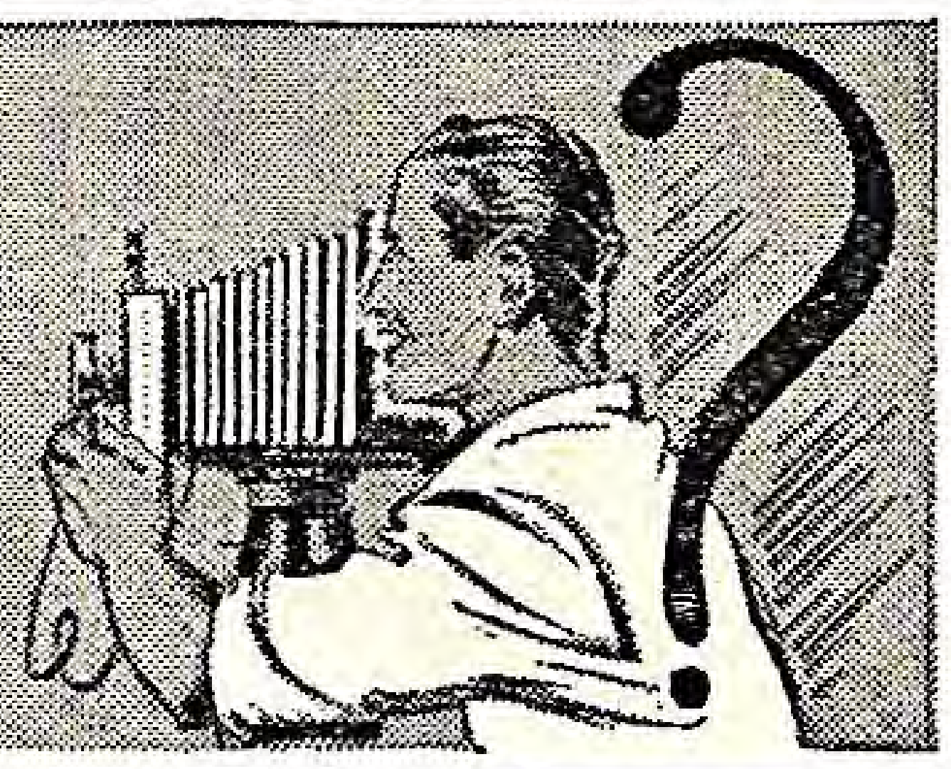
Take a FREE ride on a 1937 Harley-Davidson — ask about his Easy Pay Plans. And send in the coupon.

Ride a
HARLEY-DAVIDSON

HARLEY-DAVIDSON MOTOR CO.
Dept. MM, Milwaukee, Wis.
Interested in motorcycling. Send illustrated literature. Postage stamp is enclosed to cover mailing cost.
Name..........................
Address..........................
My age is ☐ 16-19 years, ☐ 20-30 years, ☐ 31 years and up, ☐ under 16 years. Check your age group.

AMATEUR PHOTO PUZZLERS

Your Camera Problems Answered



In this department the Photography Editor will answer any question or problem related to cameras of all types, enlarging, printing, developing, taking pictures, and the various phases of home movie making. When sending questions to this department, be sure to include a stamped, addressed envelope in case space does not permit publication of the question and reply on this page. Send all inquiries to the Photography Editor, Modern Mechanix Hobbies & Inventions Magazine, *22 West Putnam Avenue, Greenwich, Connecticut.*

PHOTOGRAPHING MIRROR PICTURES

In taking snapshots of reflections in mirrors or small ponds must the camera be adjusted to include the depth shown in the reflection or just the surface of the reflecting object? I have heard so many conflicting stories on the subject that I am dubious about it all. Can you set me straight on this?—Aaron Farrnum, Nome, Alaska.

When photographing reflected images it is necessary to add the distance from camera lens to mirror to the distance from mirror to subject setting the camera focus accordingly. Where both the subject and the reflection of the subject is to appear on the picture the focus of the camera is adjusted only to the distance from the mirror's surface to the camera lens. Trial shots will be of value in determining the proper focal adjustment.

HOW RAPID DEVELOPING IS DONE

There are several photographic establishments in our town who deliver finished prints a few hours after a roll of snapshot film has been given to them. Being somewhat of an amateur photographer myself I've often wondered just how this fast service was accomplished. Can you explain the process which they use for developing so as to be able to offer this service?—Chester Brill, Chicago, Ill.

Rapid photo service is made possible in most instances through the use of mechanical equipment and double strength developers. The usual photo developers can be used for this work simply by doubling the quantity and allowing the films to remain in the solution for just half the usual period. To speed up the negative drying process the films are washed in alcohol. This causes rapid evaporation on the gelatin surface so that it hardens sufficiently to permit prints to be made almost immediately after developing has been completed.

OVER-DEVELOPMENT REDUCER SOLUTION

I have quite a few films in my files that are over-developed and since the subjects are valuable to me I should like to reduce the density of these if this is at all possible. Can you furnish me with a suitable formula for reducing negatives?—Lester Stokes, Toledo, Ohio.

Films which have been over-developed can be reduced by first soaking the negative in water for 20 minutes then pouring the following solution over the gelatine surface of the film washing it thoroughly with water before allowing it to dry: Potassium Ferricyanide (15 grains) dissolved in 1-oz. water and hypo (1-oz.) dissolved in 32-oz. water. Mix the two solutions together and use at once since when mixed they decompose rapidly.

HOW TO PHOTOGRAPH CLOUDS AND LANDSCAPES

I have seen many beautiful professional photographs of landscapes with the clouds in the sky clearly evident. On numerous occasions I have attempted to duplicate pictures of this type yet to my dismay the clouds never show in the finished pictures. Is there any way that I can make this type of photograph using a regular folding camera?—Leslie Jackson, Oakland, Calif.

The secret of the professional pictures you mention lies in the use of a Sky Filter. This simple attachment fits over the lens of the camera and looks exactly like the usual yellow filter attachment except that only half of the glass is yellow; the remainder is clear. When a photograph is taken with this filter in place the upper portion of the filter records the clouds while the lower half which is clear photographs the landscapes in the usual manner. Any photo shop can supply such a filter for a small sum.

TAKING SNAPSHOTS IN COLOR

I have heard on several occasions that it is possible to make fair color photographs with an ordinary snapshot camera. Just where can I secure suitable film for this purpose and are pictures in color simple enough for the average amateur photographer to produce in his home laboratory?—Arthur Rossen, Washington, D. C.

Color snapshots, although still in their infancy, can be produced by any amateur photographer having a fair amount of knowledge on the subject. An interesting article on color photography appears in the MM "How To Build It", 1936 edition and explains several of the popular color processes. Another article on color photography appeared in the October, 1936, issue of MM and explained how color pictures could be made with standard roll film.

FAKING MOONLIGHT PICTURES

I have often heard that not all moonlight scenes are made at night. If this is true then how can I make pictures that will give the effect of moonlight although taken during the daytime?—Russell Vance, Toronto, Ontario, Canada.

Beautiful moonlight scenes, strangely enough, can be taken in the early evening just when the sun is beginning to set. Set the camera to a medium stop opening and snap the picture in the usual manner. To secure a moonlight effect on the prints overexpose the print so that all except the highlights will be dark when the picture is developed.

The photograph editor will pay $5.00 or $3.00 each for photographs interesting enough for publication on this page. All pictures should be mailed to Modern Mechanix Publishing Co., Greenwich, Conn.

MONTH'S BEST PHOTOS

The $3 amateur photo award for this month goes to Leon Cantrell, Nashville, Tenn., who submitted the interesting study of a child and pet dog. To F. E. McIntosh, Portland, Ore., MM awarded its $5 monthly award for his unusual picture of a snake in the act of swallowing a live frog thicker than itself.

KODAKS stay up late now

It's easy to take pictures AT NIGHT

A WIZARD picture taker outdoors—but how do you rate indoors, at night? Faster films, improved lighting open a new and exciting field to your skill. There's an endless variety to indoor picture opportunities.

Night pictures can be made with your present camera provided that it can be set for "time"; and if it is equipped with an *f*.6.3 or faster lens, then night *snapshots* are easily possible. Just load with Kodak "SS" or Kodak Verichrome Film and use Mazda Photoflood or Photoflash lamps.

FREE BOOKLET

First get the FREE booklet at your dealer's . . . then you're ready to shoot. It explains everything about pictures at night . . . which film to use . . . how to set your camera . . . suggests a variety of picture opportunities... Eastman Kodak Company, Rochester, N. Y.

PICTURES
AT NIGHT INDOORS
EASY NOW
TH ANY CAMERA

Super Sensitive Panchromatic Kodak Film
Kodak
Super Sensitive Panchromatic

Accept nothing but the film in the familiar yellow box —Kodak Film—which only Eastman makes.

Engineering Features In 1937 Autos

[*Continued from page* 45]

bigger Buick engine has been increased from 120 to 130. Specifications are: valve-in-head, 8 cylinders in line, $3\frac{7}{16}''$ bore by $4\frac{5}{16}''$ stroke, 320.2 cubic inches displacement with a compression ratio of 5.75 instead of 5.45 to 1.

Buicks have a new Aerobat, double float, single bowl, down draft carburetor which it is said will assure positive fuel feed independent of acceleration, steep grades or fast turns. The automatic choke has been re-designed to provide automatic deflooding. All models have automatic idle control. Series 40 and 60 models have a new frame using diagonal cross members. An improved heavy duty generator is a feature. Running boards are designed as radio antenna.

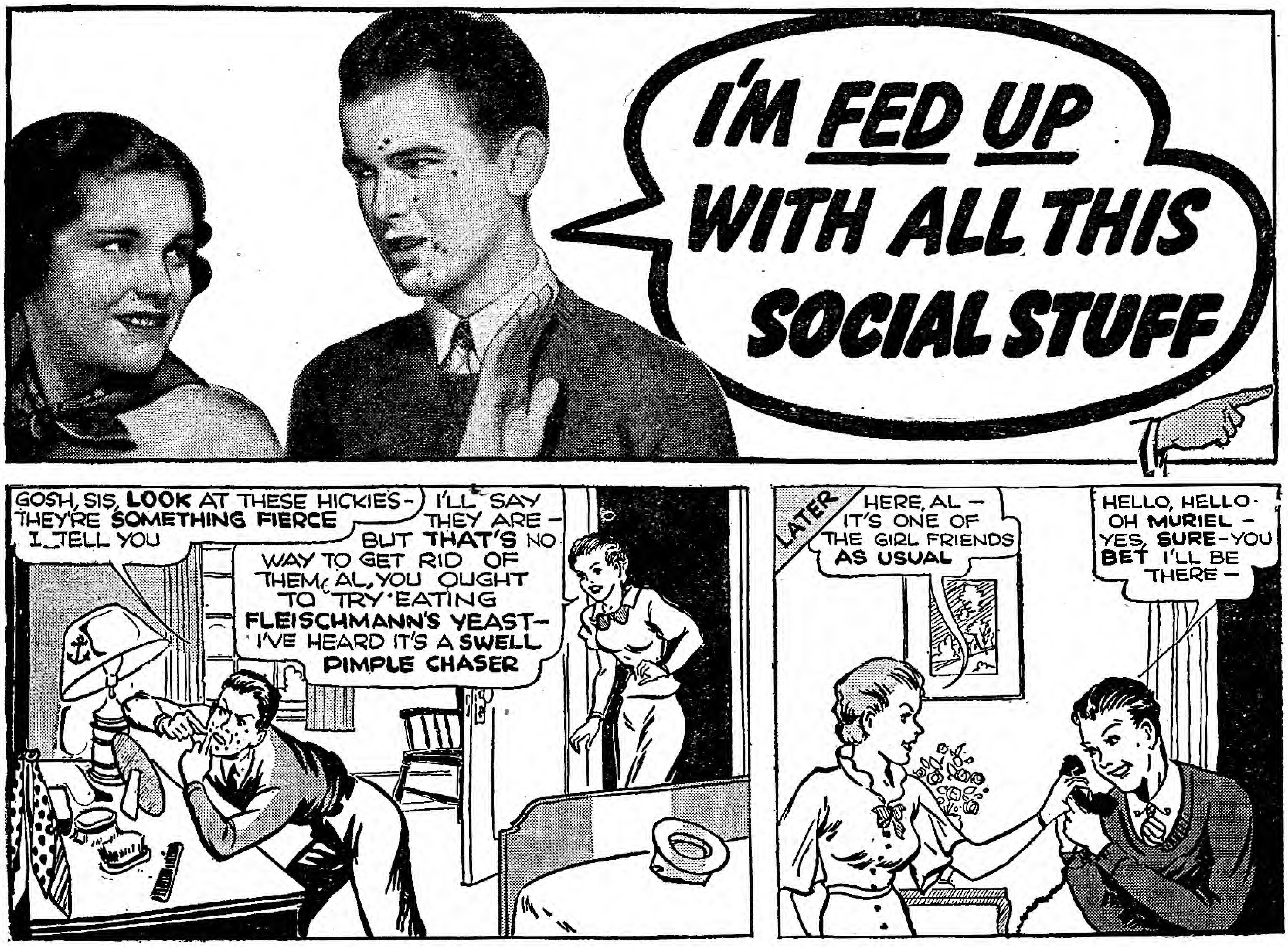
Exterior changes give a racy, bullet-like effect. The radiator grille is die-cast in two pieces with horizontal bars rising to the hood line. The hood top line and color are carried down through the middle of the grille. Bullet-shaped headlamps are molded directly into the radiator shell. Automatic windshield defrosters are available. Overall height has been dropped one inch and the floors lowered two and a half inches to provide greater head room. Both seats are wider.

New Hudson and Terraplane models are lower, longer and roomier than in the past. A new selective automatic shift transmission for use with the Electric Hand, continued as an optional extra as at present, is offered. Another optional feature is a hydraulic hill-hold device which prevents backing of the car when stopping on a hill. This device is operated by the same fluid used to apply the hydraulic brakes. The clutch pedal is interconnected with a valve through which the brake fluid passes in the application of the hydraulic brakes. This valve prevents the return of the brake fluid until the clutch is depressed, thus keeping the brakes applied until the gear change has been made and the operator is ready to drive the car forward up the hill.

An innovation in both cars is the mounting of the battery under the left front fender where it can be reached by raising the hood. A ventilating arrangement keeps the battery from being affected by engine heat. A slight change has been made in the Electric Hand, now two years old. For 1937, the reverse gate, instead of being just ahead of the low speed slot, is to the side. Previously it has been necessary to lift the shifter trigger when going into reverse.

With the new device in use with the hand controls, the cars can be driven without the use of the left foot.

Though displacement, bore and stroke remain the same, improved carburetion and manifolding have increased the horsepower from 88 to 96 on the DeLuxe model and 101 on the Super-Terraplane. Horsepower of the six-cylinder Hudson engine has been increased from 93 to 101 horsepower and that of the eight-cylinder engine from


I'M FED UP WITH ALL THIS SOCIAL STUFF
GOSH, SIS, LOOK AT THESE HICKIES - THEY'RE SOMETHING FIERCE I TELL YOU
I'LL SAY THEY ARE - BUT THAT'S NO WAY TO GET RID OF THEM, AL, YOU OUGHT TO TRY EATING FLEISCHMANN'S YEAST - I'VE HEARD IT'S A SWELL PIMPLE CHASER
LATER
HERE, AL - IT'S ONE OF THE GIRL FRIENDS AS USUAL
HELLO, HELLO - OH MURIEL - YES, SURE - YOU BET I'LL BE THERE -

113 to 122 horsepower. The makers claim a 10 per cent improvement in gasoline economy.

Graham offers three lines, two of them with supercharged engines, for 1937. Interior treatment follows a design created by Norman Bel Geddes. A center panel section of the steel roof is insulated to serve as a radio aerial. Provision is made for a windshield defroster.

An improved drive has been developed for the supercharger. The rotor now is driven from the crankshaft at 5.75 times engine speed by twin "V" belts. Turning at approximately 23,000 revolutions per minute when the engine is turning 4,000, the supercharger takes the carburetor mixture, scrubs it to a fine mist, brings it to engine temperature and packs it evenly into all cylinders at five pounds above atmospheric pressure.

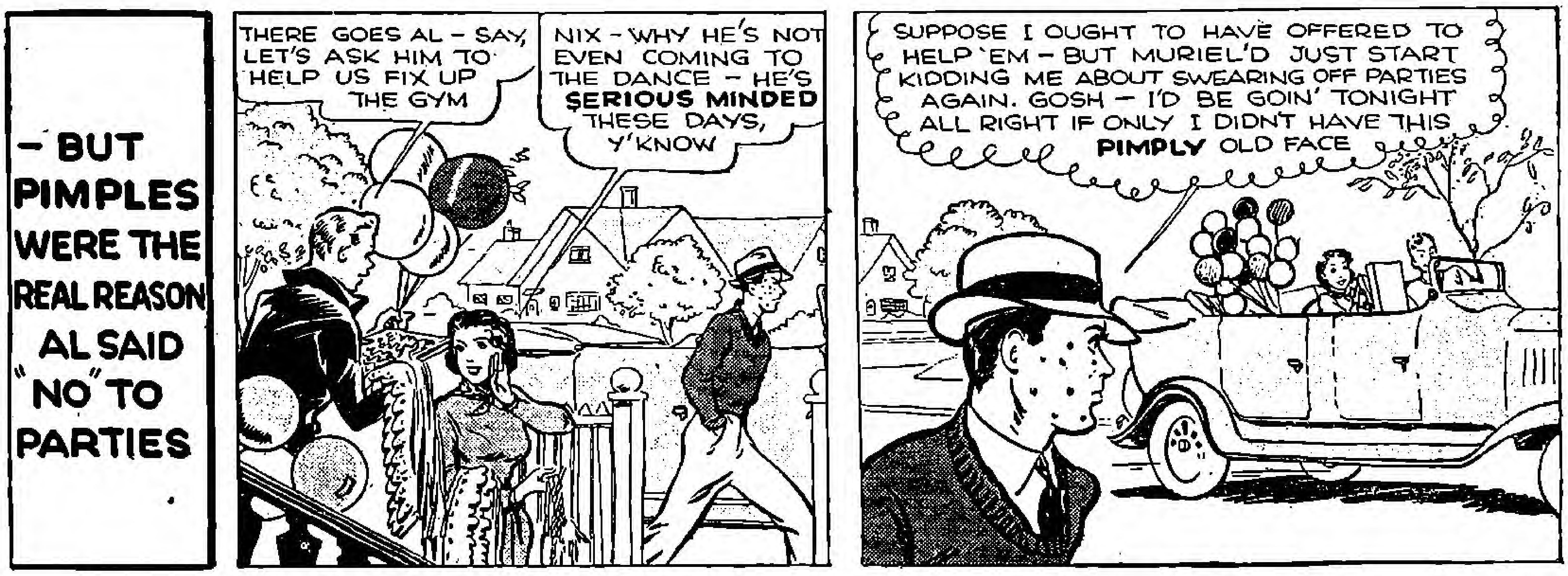
De Sotos have a new high compression engine which is said to develop 93 horsepower with unusual economy in fuel consumption. It has full length water jackets, aluminum alloy pistons, floating power, new U-shaped piston slots and automatic choke. The car has an overall length of 199 inches. The hood, stamped out of one piece, is hinged at the rear and opens from the front.

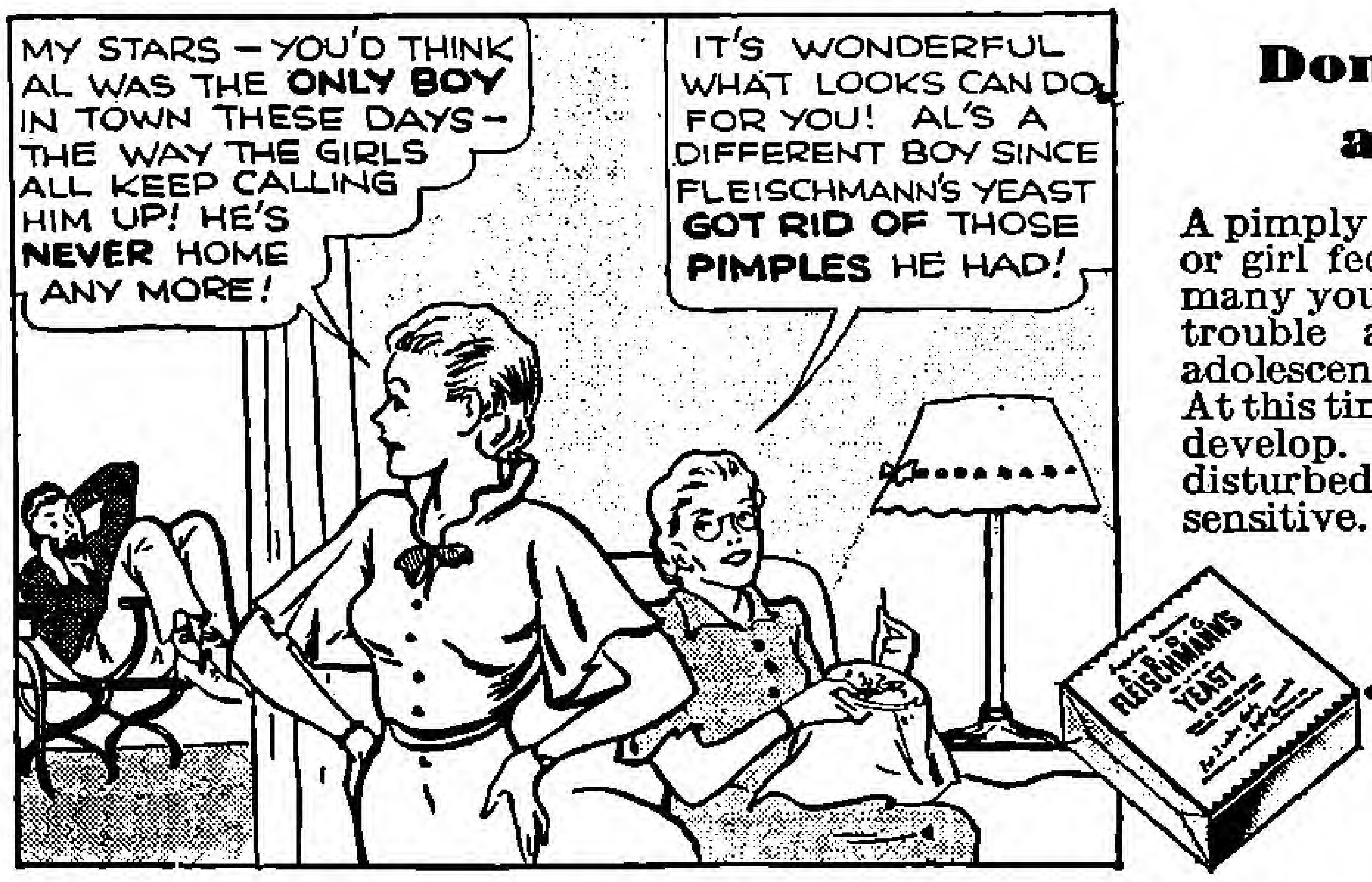
The new design eliminates the cat-walk between the fenders and the hood. Headlights are larger. Defroster vents are built into the top of the instrument panel at either end. Rubber-float body mountings at 14 points insulate the body from road noise.

Chassis improvements mark the new Studebaker Dictator and President lines. The President has a new overdrive transmission which is automatically selective. It may be cut in or out at any speed above 35 miles per hour. To cut in the overdrive, the foot is lifted from the accelerator and applied gradually. To cut it out, the foot is applied quickly. Both models have an improved gear shift, hypoid rear axle gears, double drop frame, improved automatic choke and Fram oil and motor cleaners. It is claimed that the last feature will reduce the necessity of changing oil to the seasons if the Fram cartridge is changed when the oil becomes dirty.

The parking brake lever has been removed from the floor, placed at the driver's left and suspended beneath the cowl. The 18-gallon gasoline tanks have been flattened out to give space to tools beneath a larger luggage compartment at the rear. There is a new twin lever steering gear.

In addition to New York, November automobile shows include: Nov. 9-14, Des Moines, Ia.; 11-15, Omaha, Nebr.; 12-19, Philadelphia; 13-19, Toledo; 14-20, Columbus; 14-21, Boston, Chicago, Detroit, Indianapolis, San Francisco, Seattle and Washington, D. C.; 14-22, Los Angeles; 15-22, St. Louis; 15-21, Cincinnati; and at later dates in Des Moines, Ia.; Ottawa, Can.; Pittsburgh, Pa.; Asbury Park, N. J.; Lansing, Mich.; Cleveland, Brooklyn, Buffalo, Minneapolis, Newark, Kansas City, Milwaukee, Portland, Ore.; Hartford and Rochester.


- BUT PIMPLES WERE THE REAL REASON AL SAID "NO" TO PARTIES
THERE GOES AL - SAY, LET'S ASK HIM TO HELP US FIX UP THE GYM
NIX - WHY HE'S NOT EVEN COMING TO THE DANCE - HE'S SERIOUS MINDED THESE DAYS, Y'KNOW
SUPPOSE I OUGHT TO HAVE OFFERED TO HELP 'EM - BUT MURIEL'D JUST START KIDDING ME ABOUT SWEARING OFF PARTIES AGAIN. GOSH - I'D BE GOIN' TONIGHT ALL RIGHT IF ONLY I DIDN'T HAVE THIS PIMPLY OLD FACE


MY STARS - YOU'D THINK AL WAS THE ONLY BOY IN TOWN THESE DAYS - THE WAY THE GIRLS ALL KEEP CALLING HIM UP! HE'S NEVER HOME ANY MORE!
IT'S WONDERFUL WHAT LOOKS CAN DO FOR YOU! AL'S A DIFFERENT BOY SINCE FLEISCHMANN'S YEAST GOT RID OF THOSE PIMPLES HE HAD!
FLEISCHMANN'S YEAST

Don't let Adolescent Pimples put a check on your good times

A pimply skin makes *any* boy or girl feel low spirited. Yet many young people have this trouble after the start of adolescence—from 13 to 25. At this time important glands develop. The whole body is disturbed. The skin gets oversensitive. Waste poisons in the blood irritate this sensitive skin—pimples break out.

Fleischmann's fresh Yeast clears these skin irritants out of the blood. Then, pimples go. Eat 3 cakes daily, one before each meal—plain, or in a little water—until your skin is perfectly clear.

—clears the skin

by clearing skin irritants out of the blood

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City ....State ....

Wastebasket of Distinctive Design

[Continued from page 114]

tapped carefully and will adjust itself to the side slant of the basket. Each successive band is drawn in place in like manner. Tack bands securely in place with copper roundhead tacks.

Then cut out top design of handles as shown by the dotted line in the drawing, and dress top edges smooth.

The octagon basket is made of ¼" stock. Cut out side pieces and bottom, as shown in the drawing. When the eight side pieces have been roughed out, they can be clamped together and worked as a single unit, this will speed up construction and will insure uniform sides. Bevel the edges of the bottom piece slightly to conform with slant of the basket. Then screw sides to the bottom with roundhead screws and hold sides together above with stiff wire clips as shown in drawing. To finish, stain desired color and apply a coat of white shellac followed by two coats of varnish.

Metal Tube Features Tuning

[Continued from page 94]

quarter inch space between tickler and secondary windings.

Since this circuit employs an insulated ground only wires actually indicated as being connected to ground should be thus connected. Simplification of the circuit by grounding should not be attempted.

Where all electric operation of the "DX-ER" is desired a simple power supply can be constructed, eliminating the need for batteries. The circuit is the usual rectifier type with the plate current taken off the power line. A six-volt filament transformer supplies heater current to the rectifier tube and also to the receiver's tubes through the adapter plug carrying the B current.

Form the power pack chassis from a piece of aluminum or alloy bent into the shape shown in the diagram on page 94. At one end of the chassis mount the two 25-henry chokes with the filament transformer at the opposite end. For filter capacity compact electrolytic condensers are used. These are mounted underneath the chassis in the approximate positions shown. Another five prong socket similar to the one on the receiver chassis is mounted on the power supply chassis for taking off the filament and B voltage.

Using the socket power adapters considerable time is saved in connecting the receiver to the power supply. Examination of the plug will show that one of the adapter plug's contacts carries a ground connection so that both set and power supply are automatically grounded to minimize hum.

If details are followed carefully the completed "DX-ER" and power supply will perform to your utmost expectations. Construction should not be rushed since in most instances this is the cause of radio building difficulties.

Hello Boys!

Take a good look at that giant power plant! You build it yourself with the great new Erector. Piece by piece you construct its massive steel frame. Assemble its enormous flywheel, pistons and governor. Mount its big, shining boilers. Then you hook up the powerful Erector reversible electric engine and it throbs with action.

That's only one of the many exciting mechanical marvels you can build with the great new Erector. You can make that busy looking magnetic crane. Click the switch on the Erector engine—pull the control levers and it raises or lowers—swings to the right or left, just as your hand commands. Its magnet is so strong it grabs up steel girders before it touches them.

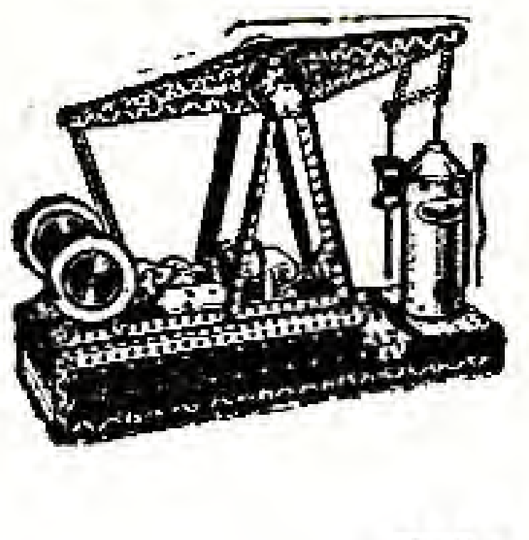
You can build *all* the engineering models shown in the picture and dozens more—with *one* Erector set. Enormous drawbridges that actually open and close. Towering airplane beacon that revolves just like the real ones. All-metal airplane. Dump-trucks. Walking beam engine. Ferris Wheel.

The great new Erector makes you a full fledged engineer—ready to build realistic, engine-driven models of the world's greatest mechanical marvels. There are more thrilling surprises packed in an Erector Set than anything you can own. Tell your Dad today that Erector is what you want most for Christmas.

Your friend,

A. C. Gilbert

Walking Beam Engine

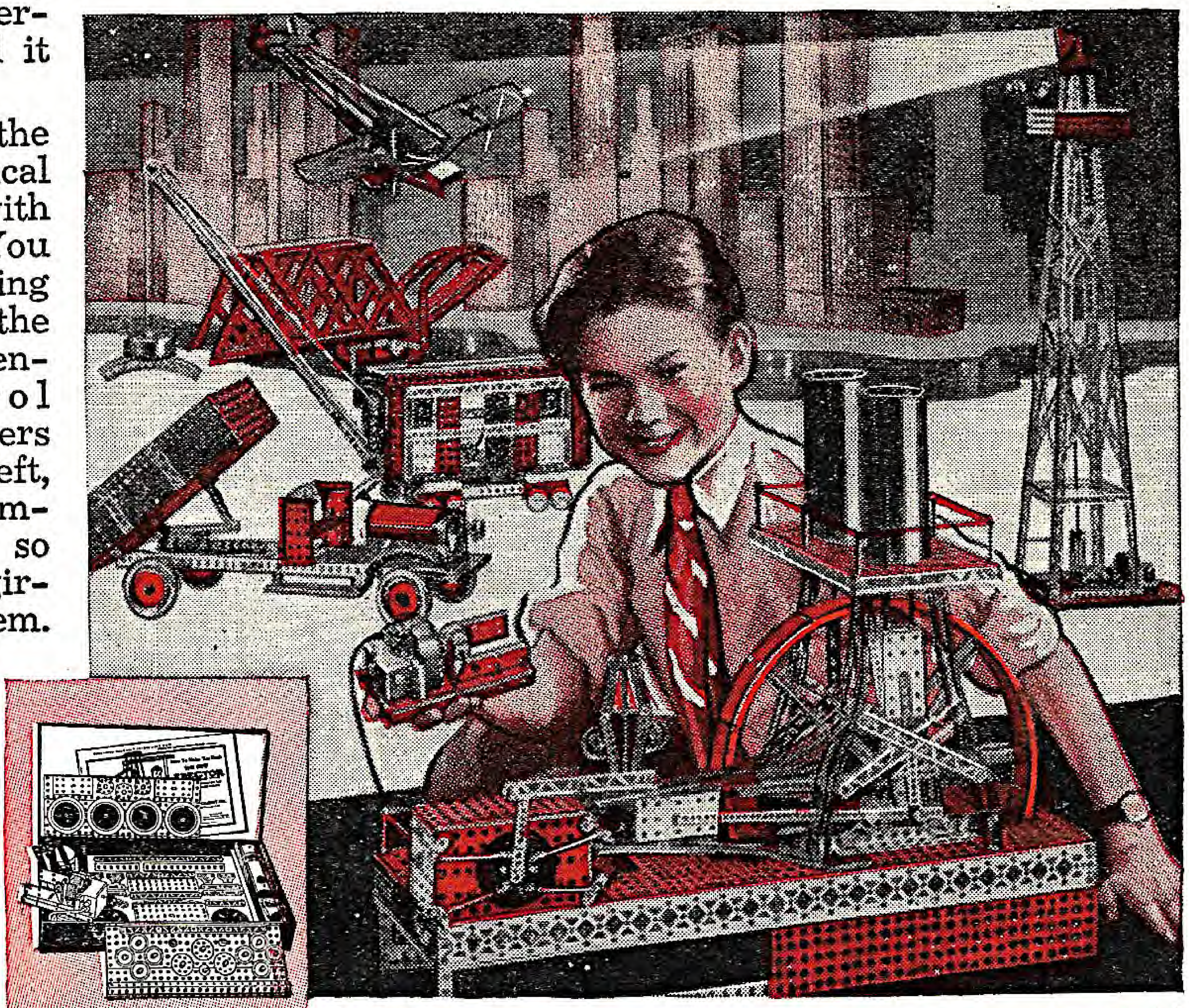


Built with the No. 7½ Set. Operated with the Erector Reversible Electric Engine.

SEE WHAT MIGHTY MECHANICAL MARVELS YOU CAN BUILD WITH

The Great New

ERECTOR



THE GREAT NEW ERECTOR

The construction set that has everything

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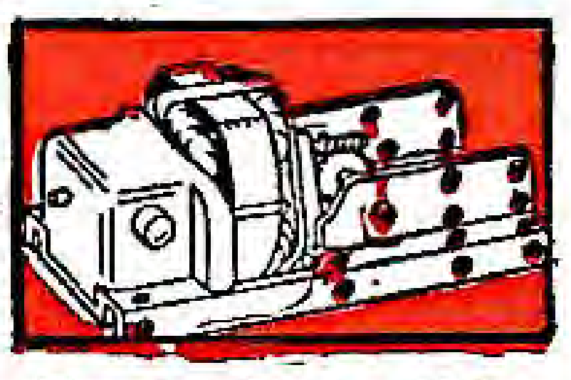
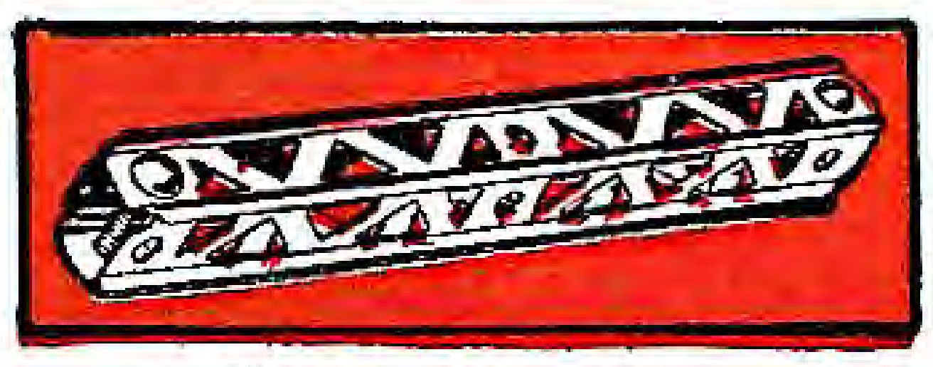
See the **SENSATIONAL No. 7½ Set**

12 pounds of exciting engineering parts. Has new Erector Reversible Electric engine. Girders and structural plates finished in red, yellow and blue. Glistening boiler shells. Big red wheels. Gears, pinions, big base plate and other parts for building all types of steam engines, derricks, trucks, bridges and over 100 action models. $10.00. Other Erector sets from $1.00 to $25.00.



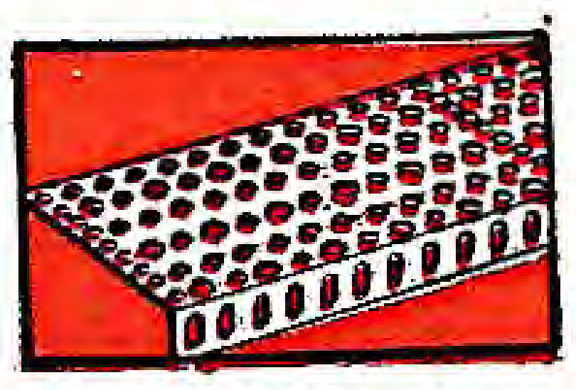
Erector Reversible Electric Engine

An adjustable power unit. Can be geared for different speeds.



Only Erector

Makes the square girder with interlocking edges. Make stronger models with Erector than any other construction set.



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Thousands Gain Solid Flesh—*in a few weeks!*

SKINNY, rundown people by the thousand with this new easy treatment have gained pounds of solid flesh—in just a few weeks. Not only that, but they've also gained naturally clear skin, freedom from indigestion and constipation, new pep.

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If you, too, need these elements, get these new Ironized Yeast tablets from your druggist today. Then watch flat chest develop, skinny limbs fill out naturally, constipation and indigestion from same cause vanish, skin clear normally—in quick time!

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To start thousands building up their health right away, we make this FREE offer. Purchase a package of Ironized Yeast tablets at once, cut out seal on box and mail it to us with a clipping of this paragraph. We will send you a fascinating new book on health, "New Facts About Your Body." Remember, results with very first package—or money refunded. At all druggists. Ironized Yeast Co., Inc., Dept. 5612 Atlanta, Ga.

1 Rich red blood, necessary to properly nourish and build up every part of the body, is especially promoted by this new discovery where iron is needed.

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3 Normal, regular elimination to remove poisons and thereby promote health and growth, calls for adequate Vitamin B. This is the third important purpose.

Casting In Aluminum And Bronze

[*Continued from page* 111]

screen. After the plaque and sand surrounding it has been covered to a depth of one inch or so pack it down carefully with a trowel then add more sand, packing it as you go, until the mold is full. Be sure to provide a hole in the top half of your mold to allow for pouring the metal. A three-quarter inch dowel stick will allow for this.

After the top half has been well packed remove it from the bottom half of the frame and lift out the plaster plaque. Dust off all loose particles, clean the pouring hole and reassemble the frame and the metal pouring proceeds.

By this time the metal should be in a molten state. Lift off the furnace coverings with the forceps and with a stick remove the slag which probably has formed on top of the liquid metal. The metal, no matter which kind you are using, should be no hotter than is necessary to cause easy flowing. Lift out the crucible with the forceps and pour the metal into the well. Don't let the pouring stop or the stream of metal break. Continue pouring until the weight of the metal has forced the liquid into all parts of the mold and builds up above the sand level. If some metal remains in the flask it should be poured into a depression made in the sand. When metal is left in a crucible and then melted, the expansion will often crack the container.

Don't disturb the casting until the exposed metal is hard. Then carefully dig out the figure from the sand. Quite often there is as much metal in the well casting and the surplus on top as was required for the casting. This can be used next time. Cut off the waste with a hack saw and then file smooth to finish.

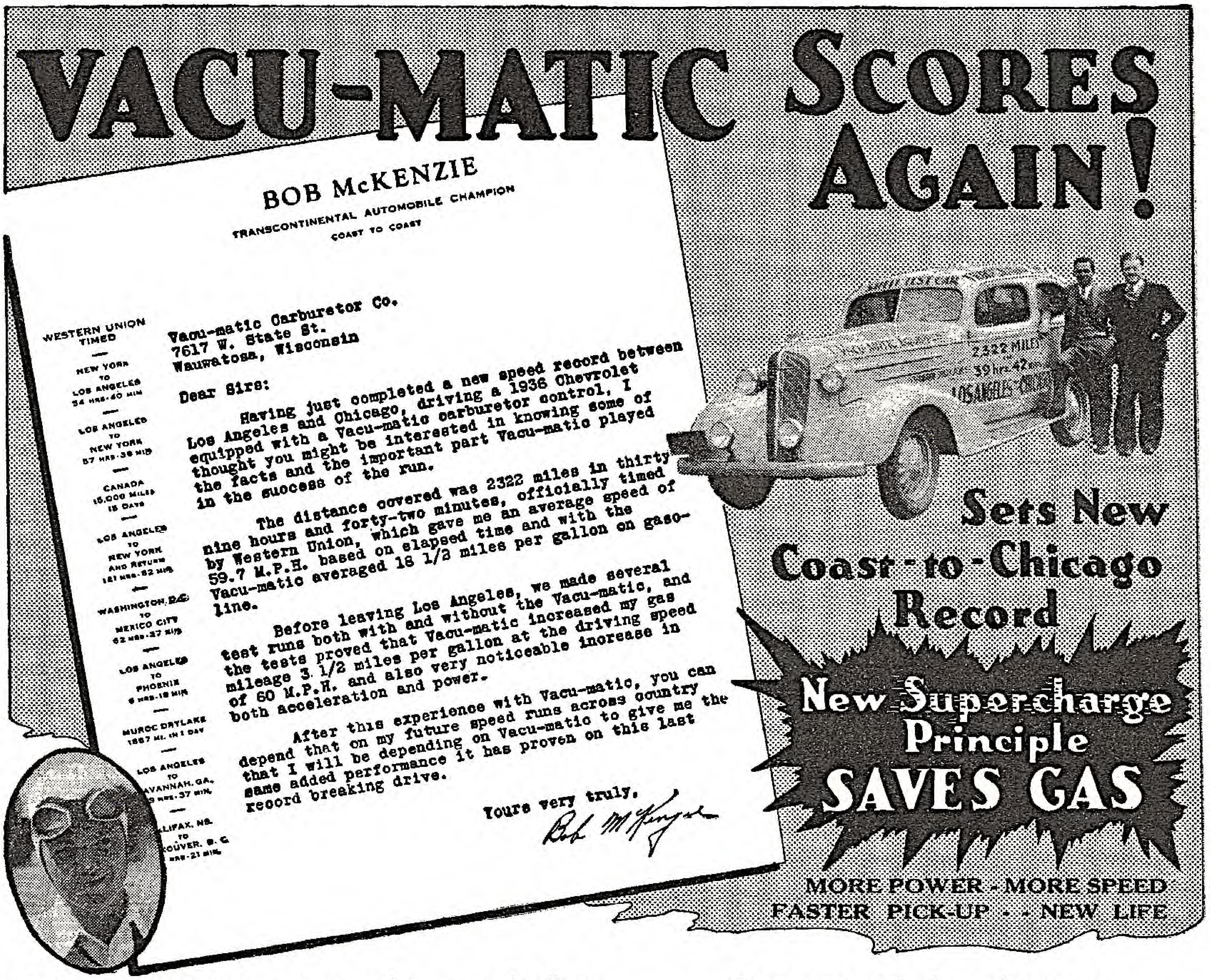
If the metal is quite hard, a steel wire wheel can be used to brighten the casting. If of aluminum, pewter or any of the softer metals, only a cloth buffing wheel should be used. However, very fine pumice or emery and beeswax rubbed into the edge of the cloth buffer will speed up the polishing. And usually, even when the wire wheel is used, the final rubbing should be done with the cloth buffing wheel.

No such casting is complete without a suitable plaque. If you have a shaper or shaper bits and drill press, the oval type is usually the most pleasing. However, with only a lathe you can make a lovely round plaque or, lacking this, you can simply saw out a square or rectangle of wood, bevel the edges and finish.

If you have access to cheap scrap copper, zinc, lead and tin you have the facilities for making almost any alloy you might wish. One of these small blast furnaces will make this possible. Perhaps our most common alloy—solder—is simply tin and lead melted together. What is known as 50-50 solder is, as its name implies, 50% tin and 50% lead. This is a soft solder. A harder solder consists of 2 parts tin to 1 part lead. Having scrap tin and lead available you can melt them down and cast your own solder in convenient bars. Before passing solder, it is perhaps interesting to note that, by themselves, tin melts at 512 de-

[*Continued on page* 153]

VACU-MATIC SCORES AGAIN!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New Supercharge Principle SAVES GAS
MORE POWER - MORE SPEED
FASTER PICK-UP - - NEW LIFE
2322 MILES
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BOB McKENZIE
TRANSCONTINENTAL AUTOMOBILE CHAMPION
COAST TO COAST

WESTERN UNION TIMED
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NEW YORK TO LOS ANGELES 54 HRS-40 MIN
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LOS ANGELES TO NEW YORK 57 HRS-36 MIN
—
CANADA 15,000 MILES 15 DAYS
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—
WASHINGTON, D.C. TO MEXICO CITY 62 HRS-27 MIN
—
LOS ANGELES TO PHOENIX 6 HRS-18 MIN
—
MUROC DRYLAKE 1867 MI. IN 1 DAY
—
LOS ANGELES TO AVANNAH, GA. HRS-37 MIN.
—
LIFAX, NS. TO COUVER, B. C HRS-21 MIN.

Vacu-matic Carburetor Co.
7617 W. State St.
Wauwatosa, Wisconsin

Dear Sirs:

Having just completed a new speed record between Los Angeles and Chicago, driving a 1936 Chevrolet equipped with a Vacu-matic carburetor control, I thought you might be interested in knowing some of the facts and the important part Vacu-matic played in the success of the run.

The distance covered was 2322 miles in thirty nine hours and forty-two minutes, officially timed by Western Union, which gave me an average speed of 59.7 M.P.H. based on elapsed time and with the Vacu-matic averaged 18 1/2 miles per gallon on gasoline.

Before leaving Los Angeles, we made several test runs both with and without the Vacu-matic, and the tests proved that Vacu-matic increased my gas mileage 3 1/2 miles per gallon at the driving speed of 60 M.P.H. and also very noticeable increase in both acceleration and power.

After this experience with Vacu-matic, you can depend that on my future speed runs across country that I will be depending on Vacu-matic to give me the same added performance it has proven on this last record breaking drive.

Yours very truly,
Bob McKenzie

ESTABLISHING new mileage records on cars in all sections of the country, the Vacu-matic again scores in a new speed record established by Bob McKenzie transcontinental automobile champion. Los Angeles to Chicago — 2,322 miles in 39 hours and 42 minutes— driving 75 and 80 to maintain a speed average of 59.7 miles per hour!

Here is speed—a gruelling grind—where quick accelaration, greater top speed — and less stops for gasoline mean those precious moments saved that make new speed records possible

The same Vacu-matic that helped Bob McKenzie establish this speed record and gave him such fine gas savings is now available for all car owners. It is positively automatic—simple to install—inexpensive—and pays for itself many times over in gas savings.

Automatic • • Nothing Like It!

Vacu-matic is *entirely different!* It operates on the supercharge principle by automatically adding a charge of extra oxygen, drawn free from the outer air, into the heart of the gas mixture. It is entirely AUTOMATIC and allows the motor to "breathe" at the correct time, opening and closing automatically as required. No idling troubles—no carburetor adjustments necessary. It is so simple it will amaze you—so practical it will save you many dollars on gas costs.

Agents and Salesmen

VACU-MATIC offers a splendid opportunity for unusual sales and profits. Valuable territories now being assigned. Check and mail coupon.

Fits All Cars

VACU-MATIC is constructed of six parts, assembled and fused into one unit, correctly adjusted and *sealed at the factory*. Nothing to regulate. Easily attached in ten minutes.

The VACU-MATIC Co. Wauwatosa, Wis.

Guaranteed Gas Savings

VACU-MATIC must prove itself on every car. It is guaranteed to give worthwhile gas savings, quicker pick-up and more power, or it costs you nothing. "On my V-8 Ford it works miracles", says Ralph Fields. James Seeley —"On an International Truck on a round trip to Cleveland, 385 miles, it saved 19 gallons of gas." A. V. Grove —"On the Buick it showed 5 miles more per gallon." F. S. Peck—"I average 22 miles per gal. on my Plymouth, an increase of 7 miles, for a saving of $15.00 a month, or $180.00 a year." Wm. Lyons—"Averaged 25 miles on a gal. with a Model A Ford at 40 miles per hour."

Free Details

You owe it to yourself to know all about this remarkable discovery. Mail the coupon below. Start saving gas with VACU-MATIC and enjoy a new driving thrill! There's no obligation—so get the facts now! Write today!

FREE OFFER COUPON

THE VACU-MATIC COMPANY
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Gentlemen: Please send me full particulars concerning the Vacu-matic and details of your Free Offer. This of course does not obligate me in any way.

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Don't send us a cent—just your name and address and we ship all of these books to you for ten days free examination. Look them over carefully, see how easy it is to find out the things you want to know, and then decide whether or not you want to keep them. The price and terms are so low that everyone should have them on hand for ready reference. Billions of dollars are being used to make jobs and the Home Modernization Program offers the biggest chance to make money carpenters have ever known. Are **YOU** Ready? Can you remodel from start to finish—do you know the tricks of estimating, laying out, etc.? Here's your chance to get these facts—quickly—easily, without study or work—just put your finger on what you want to know instantly.

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These Drawing Instruments ($10.00 Value) Included

Complete set of drawing instruments if you send for these building books NOW. These instruments are made of the finest German silver, are absolutely accurate and are packed in velvet lined leatherette pocket case. Real $10 value, but free to you with these books.

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I would like to look at the five books described above. Send them on your free offer. I will pay the few cents delivery charges only and will examine them thoroughly and return them in ten days unless I like them, in which case I will send you $2.00 and after that $3.00 per month until the total price of only $19.80 is paid. You are also to send me the drafting instruments and consulting membership certificate of the American Technical Society, without extra charge.

Name --

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Please attach letter stating age, employer's name and address and that of at least one business man as a reference.

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Lower your power cost with a smooth-running WITTE Diesel. Operates on non-explosive fuel at one-eighth the usual cost of a gasoline engine. The savings in fuel alone will soon pay for it. 5 and 10 H-P. Also Diesel Light Plants.

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CROSMAN SILENT .22 RIFLE

Adjustable peep sight

NO CLEANING
ADJUSTABLE POWER
LOW COST AMMUNITION

Rifled barrel

Grooves inside barrel make the Crosman a real rifle with all the hair-splitting accuracy this term implies. Shoots bullet (pell) same diameter as .22 powder rifle, but silently, powerfully, with no recoil, using the terrific force of compressed air—same force U. S. Navy uses to drive 2000 lb. torpedoes. Marvelous for target, small game. Single and 20-shot repeater models. No license required.

SuperPells

Best for all .22 cal. air rifles. Heavier, longer, more perfectly formed (secret process), thus harder hitting and more accurate. Made to American standards by American workmen. Write for Free folder.

FREE BOOK

Containing important target and game shooting facts; also Crosman Catalog. Write. Ask Your Dealer to Show You a Crosman.

CROSMAN ARMS CO., Inc., 425 St. Paul St., Rochester, N. Y.

Methods Of Deer Hunting

[*Continued from page* 85]

there being many hunters in the woods, the possibility of being mistaken for a deer in stealing through the woods is increased. This, however, can be off-set as a hazard by the wearing of the regulation red cap and a slip-over for the coat, also in bright red, that can be purchased at most sporting goods stores.

Probably the most difficult time of all in the woods for still hunting is during a dry autumn, when the leaves are thick on the ground and neither snow nor rain has come on to dampen them. In a case of the sort every step one takes sends up a crackle that is heard for some distance.

While a soft snow is excellent for soft footing through the woods, and makes trailing easy, it has a distinctly bad point in that should a freeze follow, the snow will take on a crust, which is the most difficult of all to hunt over because it will send up a crunching sound that will send a warning for a great distance.

The deer, as regards their movements in the woods, act very much like the human family. After chilly weather, should mild weather come on, the deer (like the human being), become drowsy and are likely to bed down for a comfortable nap that may extend over a period of many hours. At such a time you will hunt far and wide without seeing a deer.

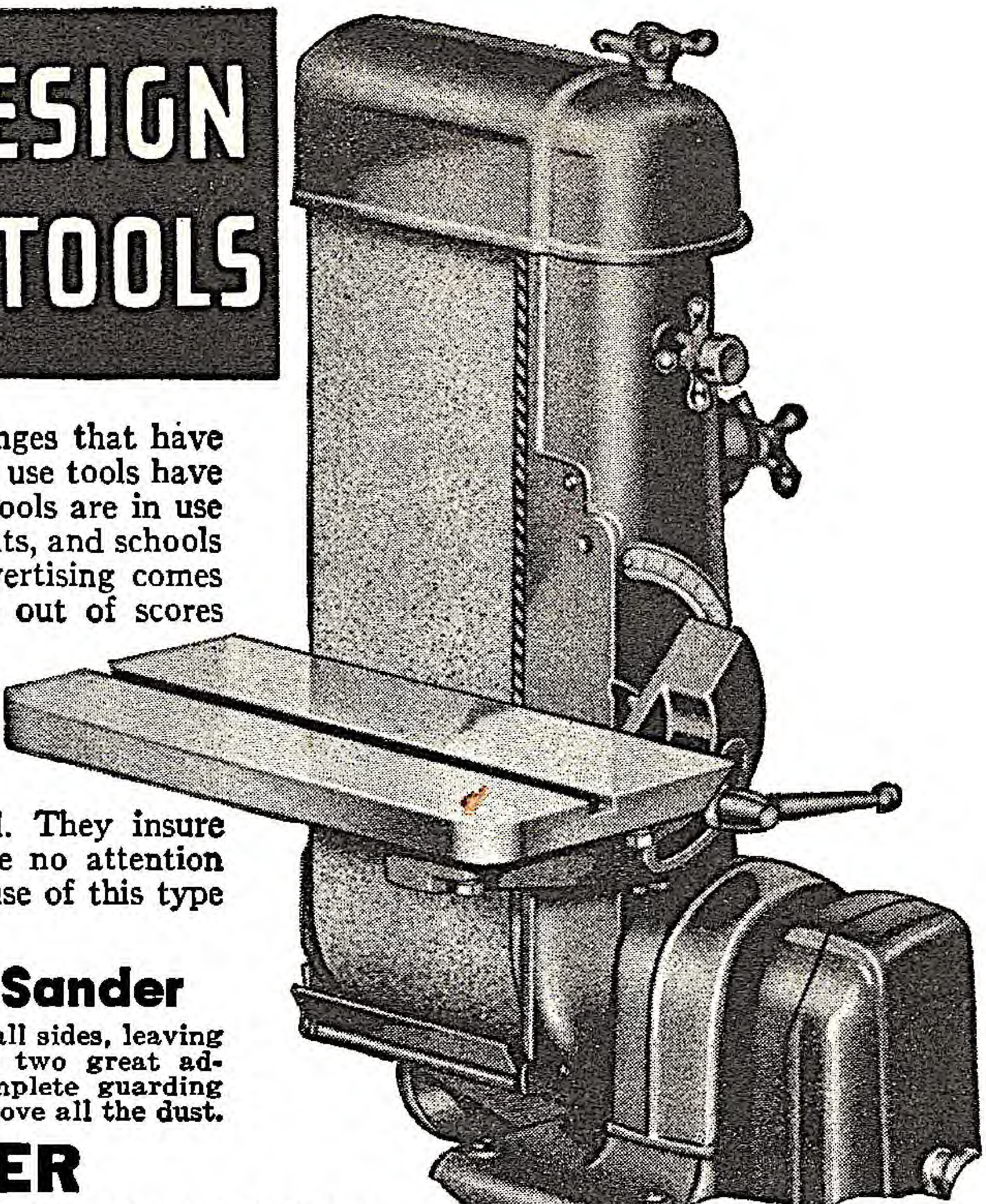
Quite the opposite is true when the weather turns snappy and one needs to be in action to keep the blood moving freely. Then the deer are on the move and the chance of a kill is greatly increased. It will be found that several hours before a storm is due the deer will go into the depths of the woods, cedar or spruce swamps, and will bed down. While stormy weather may not be considered a good time to be out in the woods, it may be stated that moving through the woods at this time may give you an opportunity to surprise a deer at close quarters. If still hunting it should always be kept well in mind that the wind must come toward you and away from the deer, for the slightest scent conveyed to the deer will mean that your hunting will be entirely in vain. A day of shifting winds, blowing this way and that, is the worst of all deer hunting days. A strong wind, coming from one quarter, is the best. Wind, likewise, deadens sound.

Most deer hunters get started hunting too late in the day with the result that they see no deer, nor do they obtain the desired shot. The hunter should be on the move just about the time it is getting light, for then the deer are out feeding. This tapers off until at about 8 o'clock the feeding is over and they move into the deep woods to lie down. They start feeding again around 4 and continue until dark.

While there are woodsmen who kill their deer at close range by stalking them, using no other weapon than a .22 caliber rifle shooting an L. R. cartridge, making a killing head shot every time,

[*Continued on page* 138]

WHY "DELTA" DESIGN MAKES BETTER TOOLS



Delta engineers have pioneered fundamental changes that have basically improved motor-driven tools. Men who use tools have been quick to recognize this. That's why Delta Tools are in use in tens of thousands of home shops, industrial plants, and schools all over the world. That's why Delta's best advertising comes from satisfied users. To illustrate, here are two out of scores of features that make "Delta" Tools better:

Double-sealed Ball Bearings

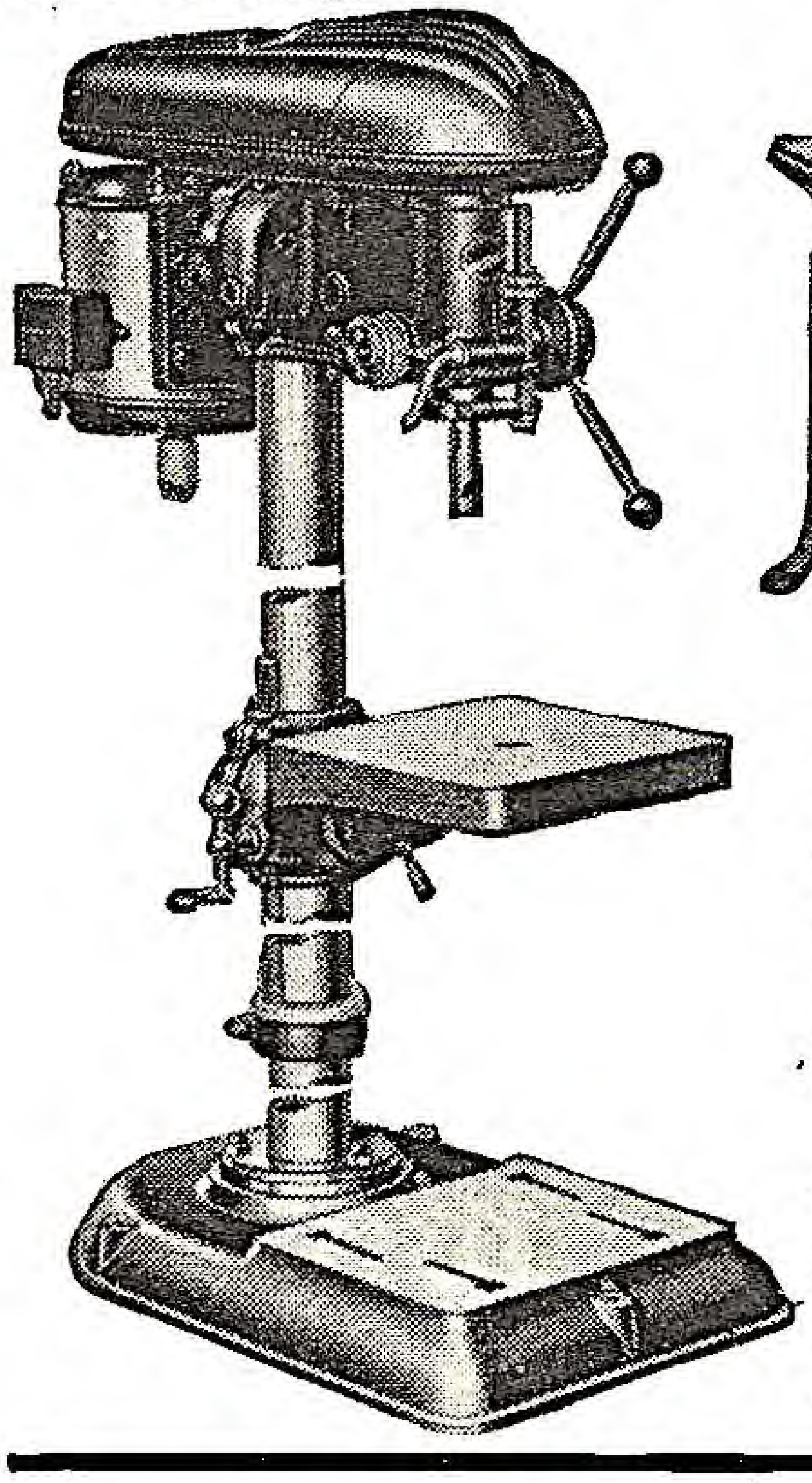
Delta uses only "double-sealed" ball bearings. The very finest type made. They are lubricated at the factory and need never be re-lubricated. They insure complete absence of bearing trouble, and require no attention during their entire life. Delta has pioneered the use of this type of bearing in "low-cost" tools.

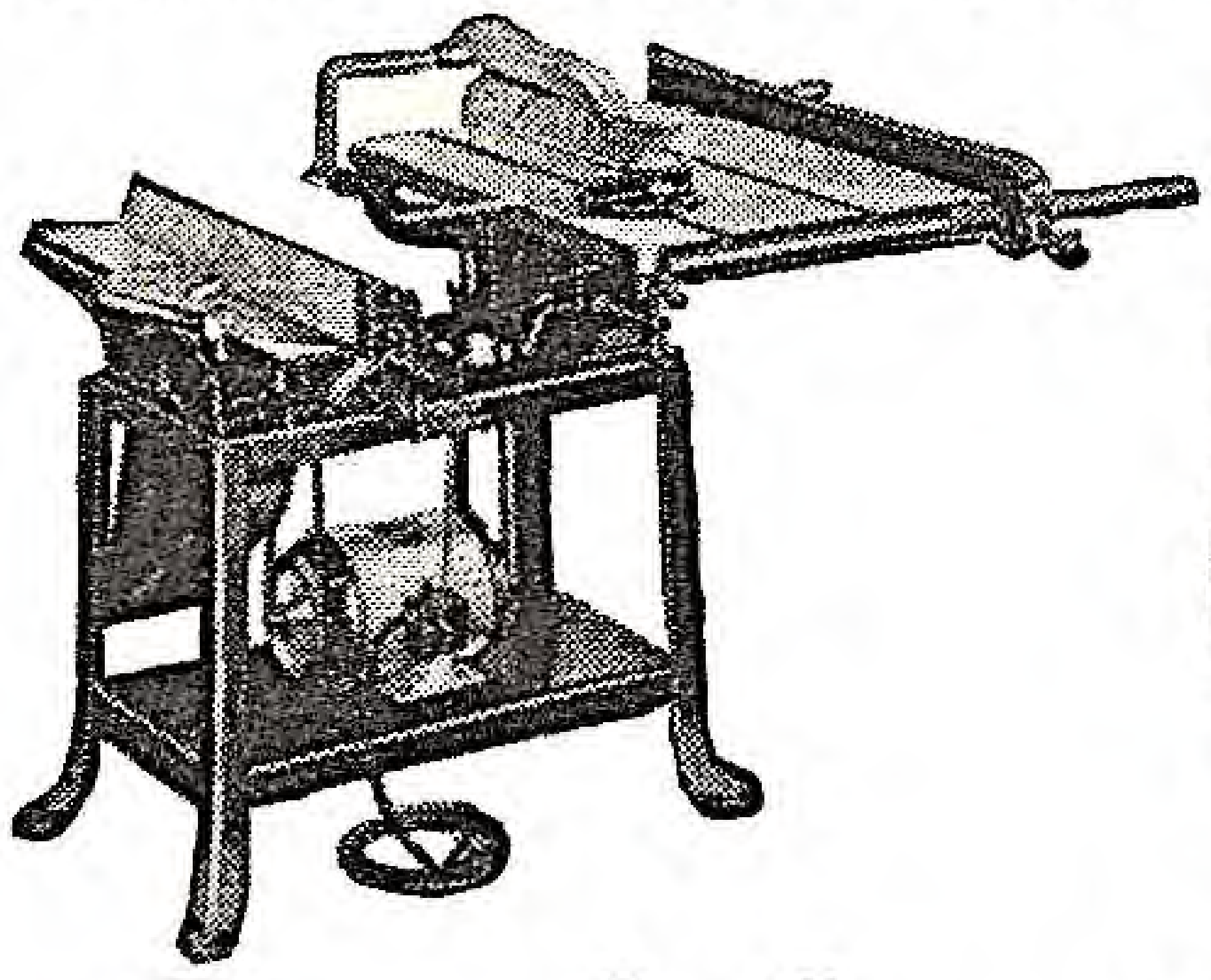
Complete Enclosure of Belt Sander

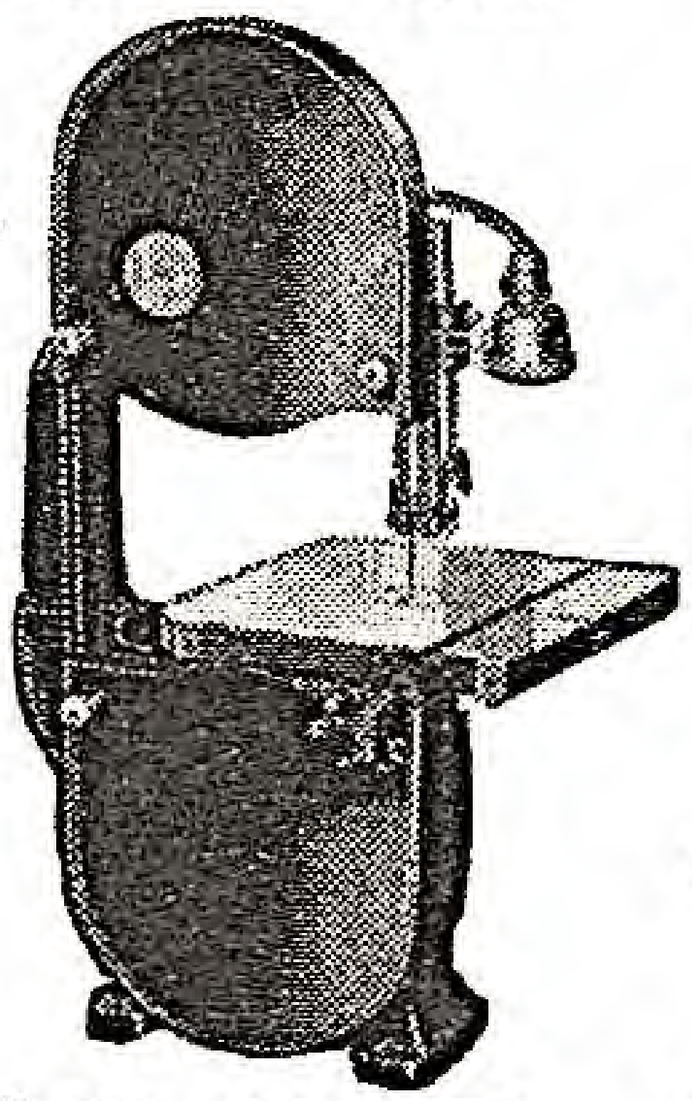
The New Delta Belt Sander is completely enclosed on all sides, leaving only the sanding surface exposed. This design has two great advantages: First: it gives the Sander the most complete guarding possible; Second: it permits the suction system to remove all the dust.

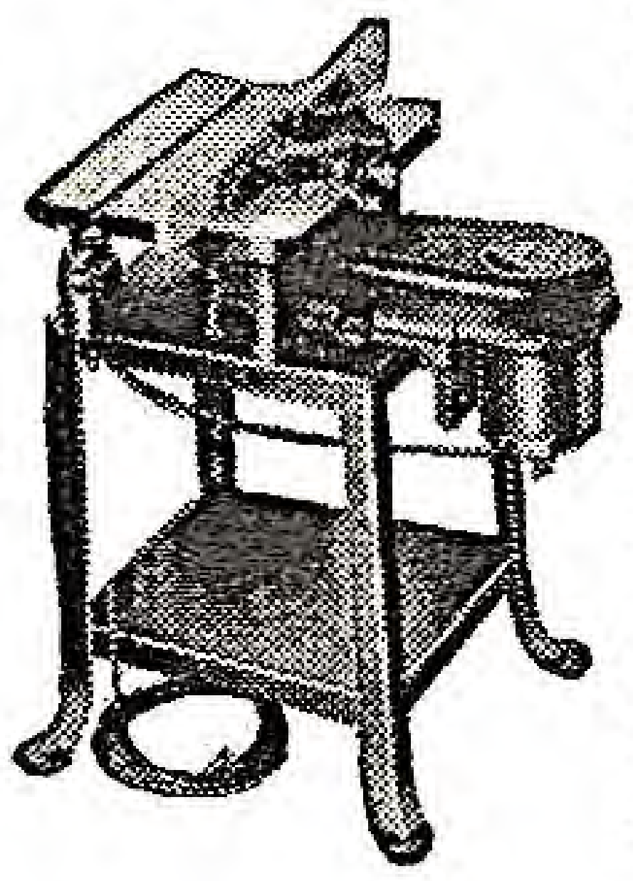
NEW BELT SANDER

The very last word in sanding machines. Has numerous new features including complete ball-bearing equipment with all ball bearings "double sealed" and lubricated for life of bearing, full 6-inch width of sanding surface. Operates in both vertical and horizontal positions. For complete details see new 1937 Delta Catalog.









The complete Delta line includes Drill Presses, Circular, Band, Scroll Saws, Lathes, Shapers, Sanders, Binders, and full line of accessories.

Send for 1937 CATALOG

It is crowded with interesting illustrations and descriptions of the complete Delta line. Points out in detail the important features of Delta design. And also the new 32-page book No. 3 of "Practical Delta Projects" crowded with new and "out of the ordinary" things to make—with many photographs, working drawings, and easy-to-understand illustrations. Simple, complete instructions make every project easy to follow. Every woodworker should have this book. Send 10c with coupon for Delta Project Book No. 3, 1937 Delta catalog mailed postpaid.

The new Delta 17-in. Drill Press is the greatest drill press value ever offered. The facts prove it. See Delta Catalog.

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( ) Check here if you are a Delta user now.

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IMPORTANT: Outside of the United States and its possessions, Delta Tools are known as "TAUCO" Tools. Tauco tools are identical in *every respect* to Delta Tools.

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10 in. JIG SAW $1.49

The Champion—America's outstanding power tool value. Cuts up to 1½ inches. Has 8-inch table, 10-inch throat, sturdy frame, adjustable guide, enclosed top spring. V-belt pulley drive. Takes 5 inch plain-end saw blade. Runs quietly. Shipping wt. 6 lb. Price **$1.49.** 6 all-purpose blades, **15c** extra. 5 assorted blades, **15c extra.**

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Christmas Greeting Cards

[*Continued from page* 99]

photograph so that when closed the group is looking out the window. The greeting is lettered inside the card in black ink or water colors.

Another novel greeting card that will especially please the children consists of a simple cardboard fireplace and chimney. When the flap at the bottom of the card is pulled the greeting vanishes, a log fire appears in the fireplace and Santa makes his appearance at the top of the chimney. The fireplace is sketched or traced on the cardboard then inked and colored to suit. The fireplace opening is cut out as shown in the illustration on page 99 and a slide inserted on which a log fire and greeting have been sketched. At the top end of the slide attach a Santa Claus Christmas seal or draw in the figure just as you wish. After assembling the card the slide can be worked up and down to reveal the greeting in the fireplace.

Novel Table-Top Photographs

[*Continued from page* 101]

enjoy making shots at night with a lens opening of f.8, f.11 or even smaller, because you can take all the TIME you need for exposures.

A glance at the picture of "the set" will show that the stage effect was secured by using a piece of wallboard on wooden blocks for the floor. The "curtain" is merely a piece of cardboard. The "pillar" is a piece of curtain roller with silver paper tacked around it and extending to one side far enough to give the effect of being the side of a proscenium arch.

To secure the footlight effect, a piece of cardboard is tacked upright to wooden blocks, and curved in such a manner that the card conforms to the front curve of the stage floor. Leave a space of about ¾ of an inch between the card and the stage floor, and have the card project about ⅝ of an inch above the stage floor. Then place a photo flood lamp beneath the floor and as far forward as possible, so the light will be projected through the opening at the front of the stage floor. (Be sure to provide insulation as protection against scorching the stage "properties.") Place your subjects for interesting lighting effects—and shoot!

For the spotlight effect use black paper on the back curtain and stage floor. Cut a piece of white paper, not perfectly round, but elliptical in shape. Cut this ellipse in two parts; paste the larger part on the back curtain, the small part on the stage floor, with the two parts matching perfectly. Place the subject in position and use a photo flood lamp in a reflector to light the model from the front at about the angle from which a real spotlight would be directed toward the stage. The white "spot" of paper on the black background will produce the desired lighting effect.

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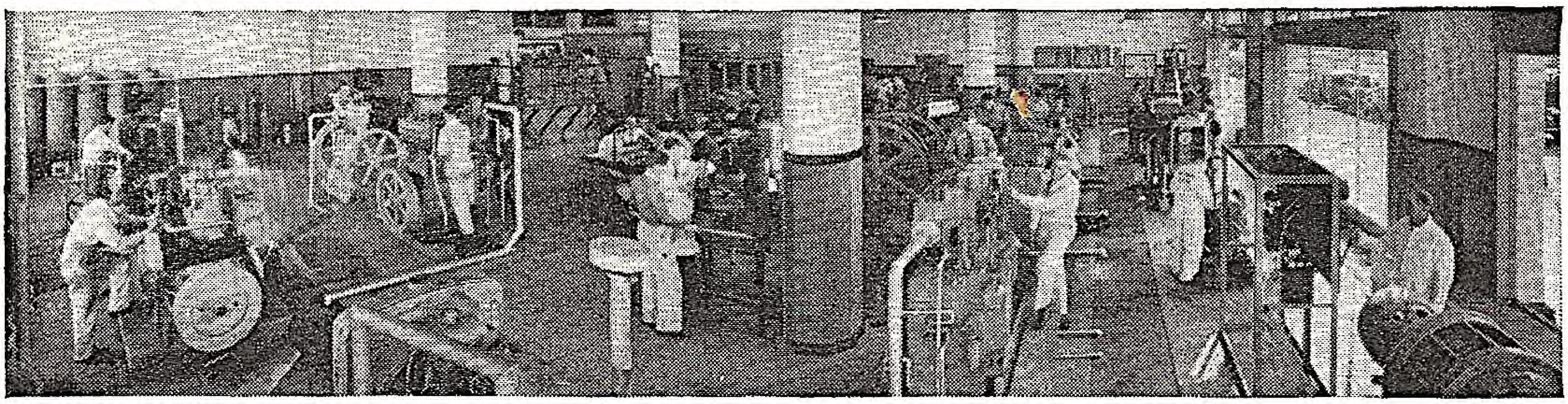
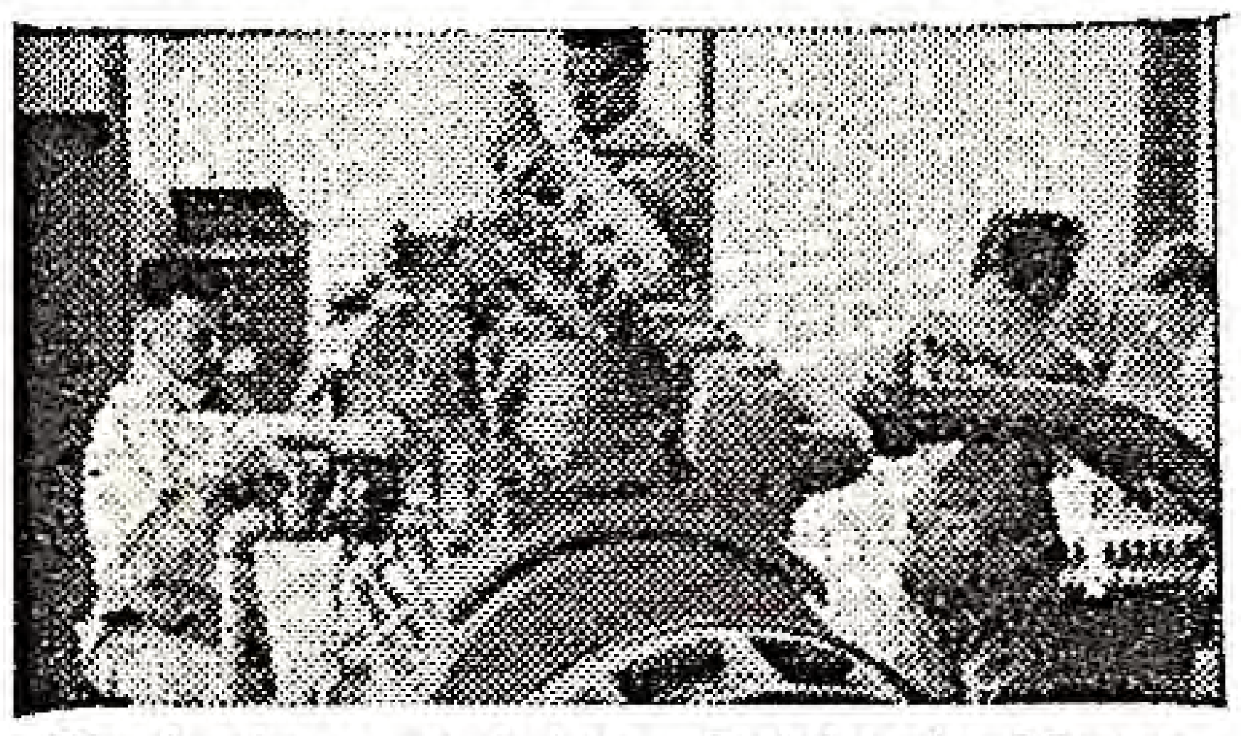


Partial view of Diesel-engine operating room—one of the important Departments at National Schools.



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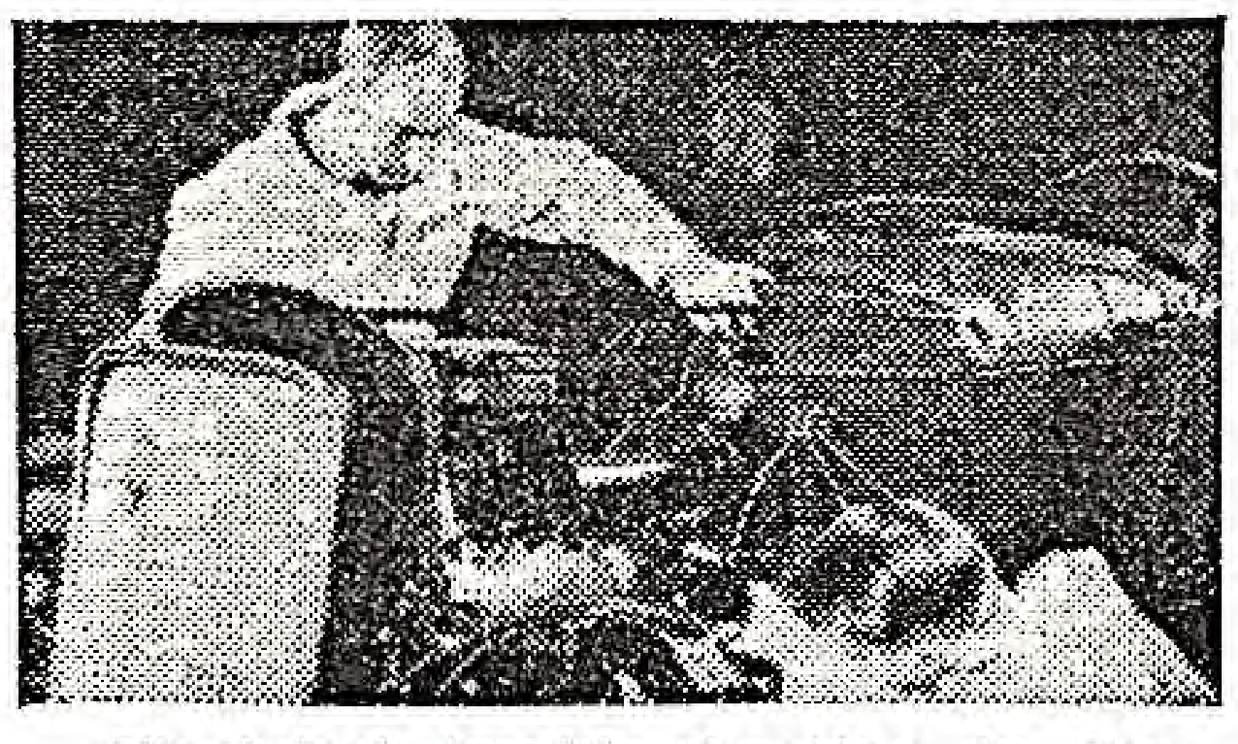

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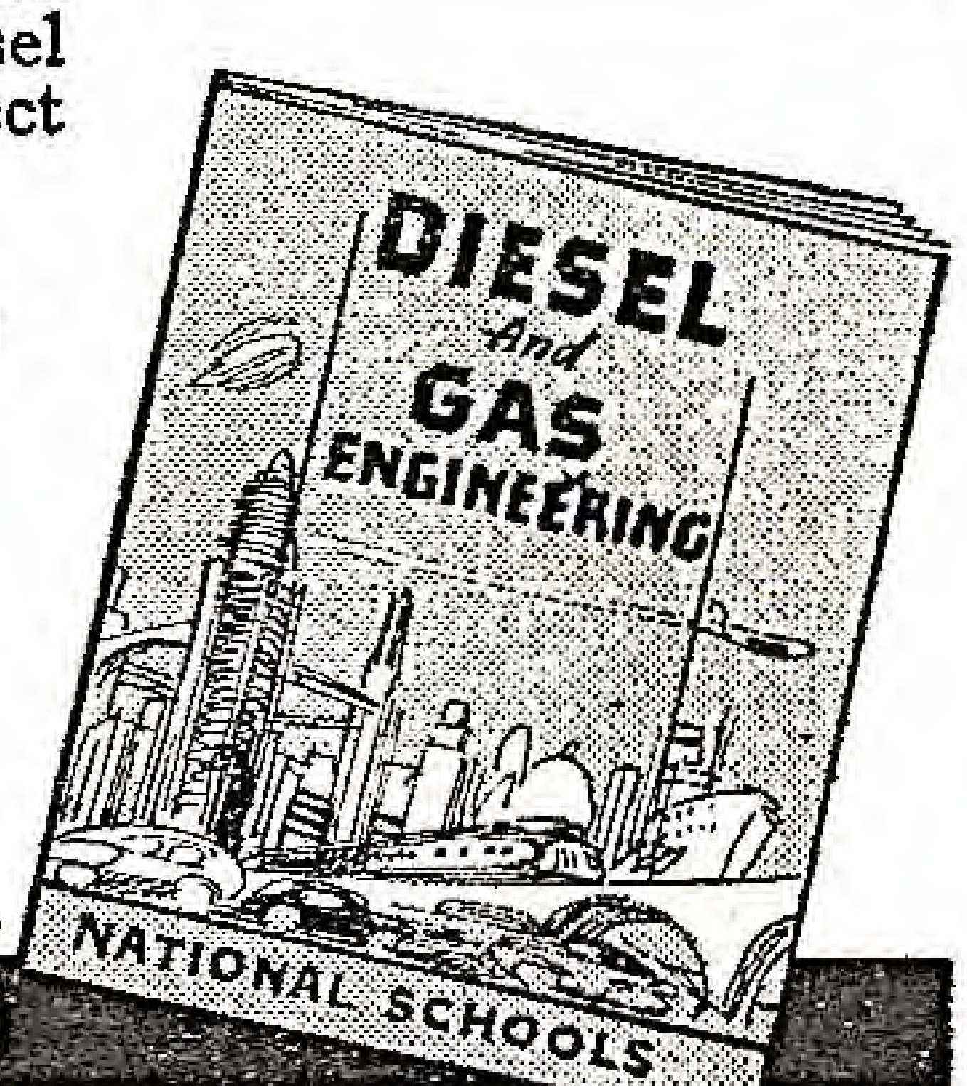

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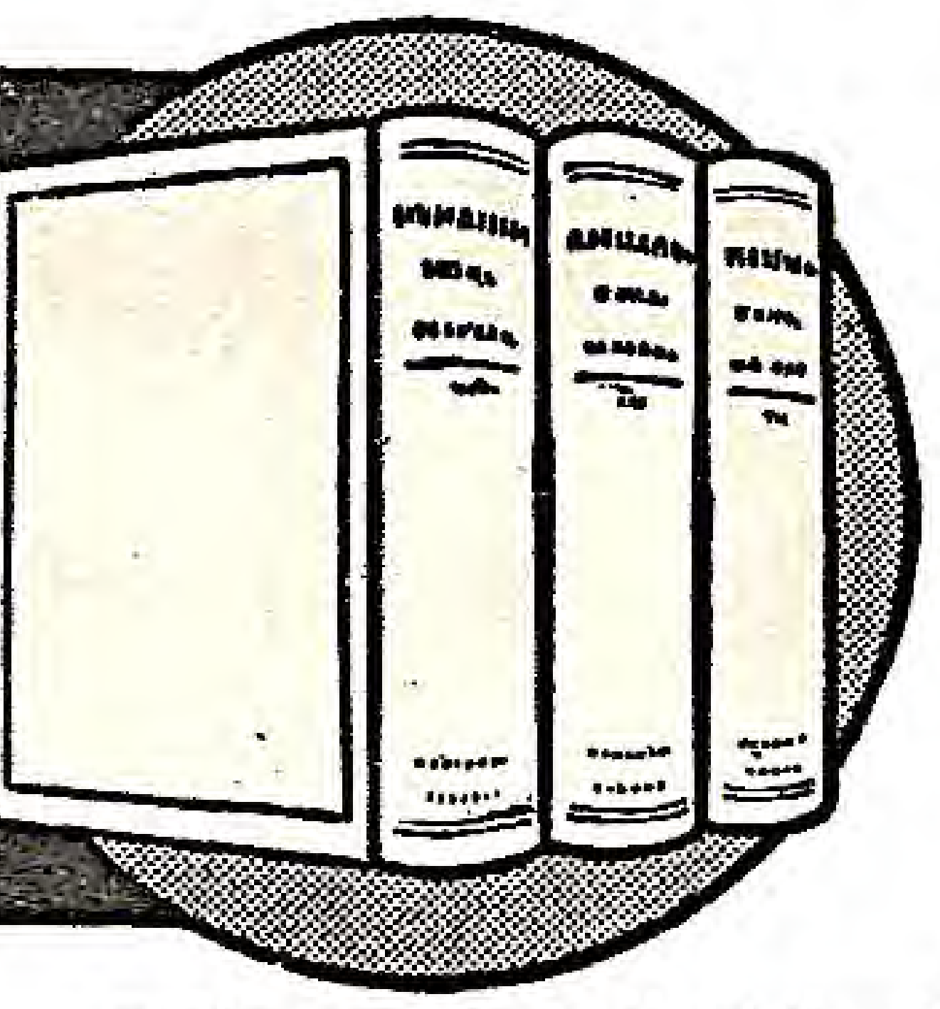

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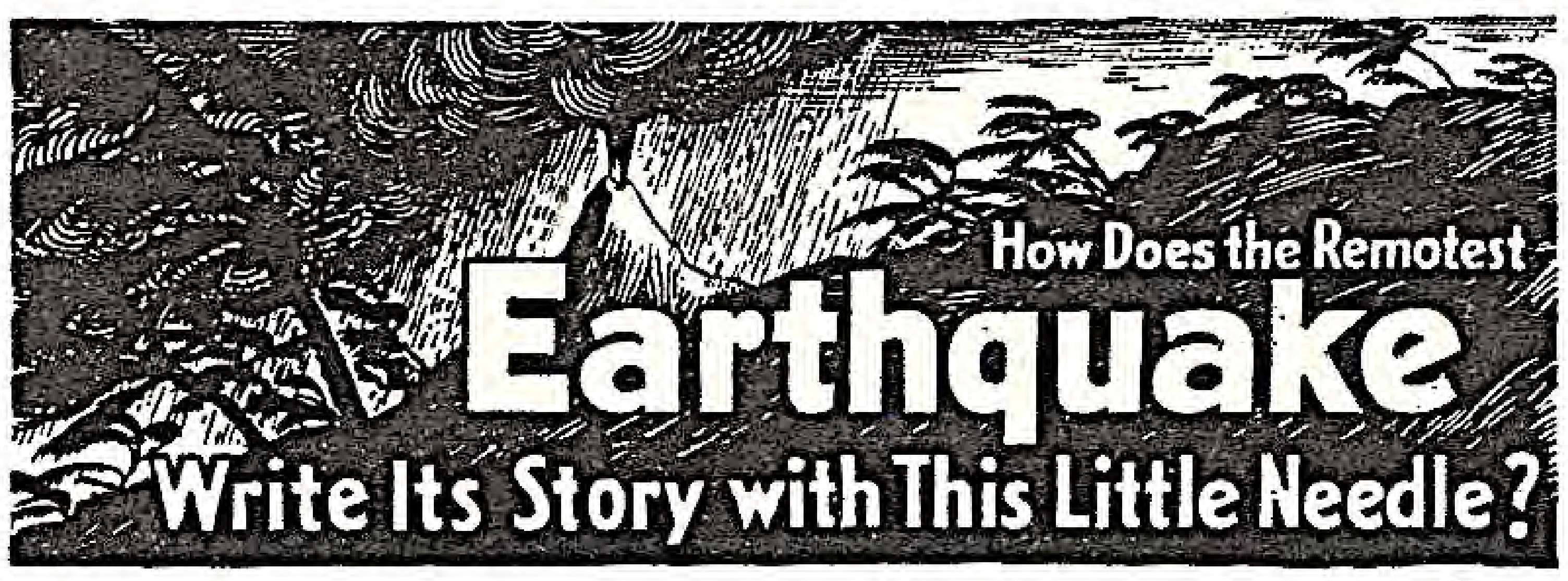
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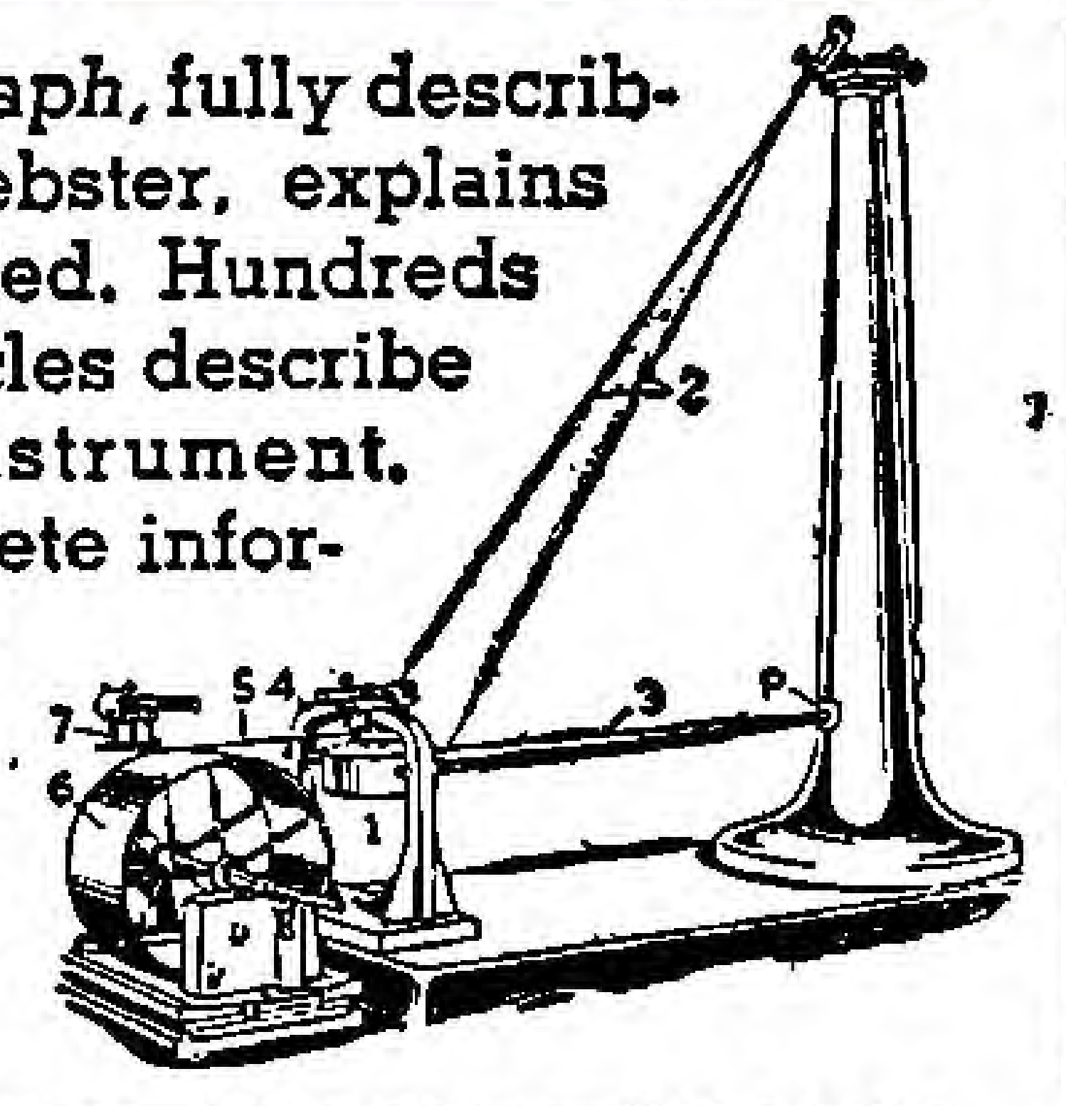

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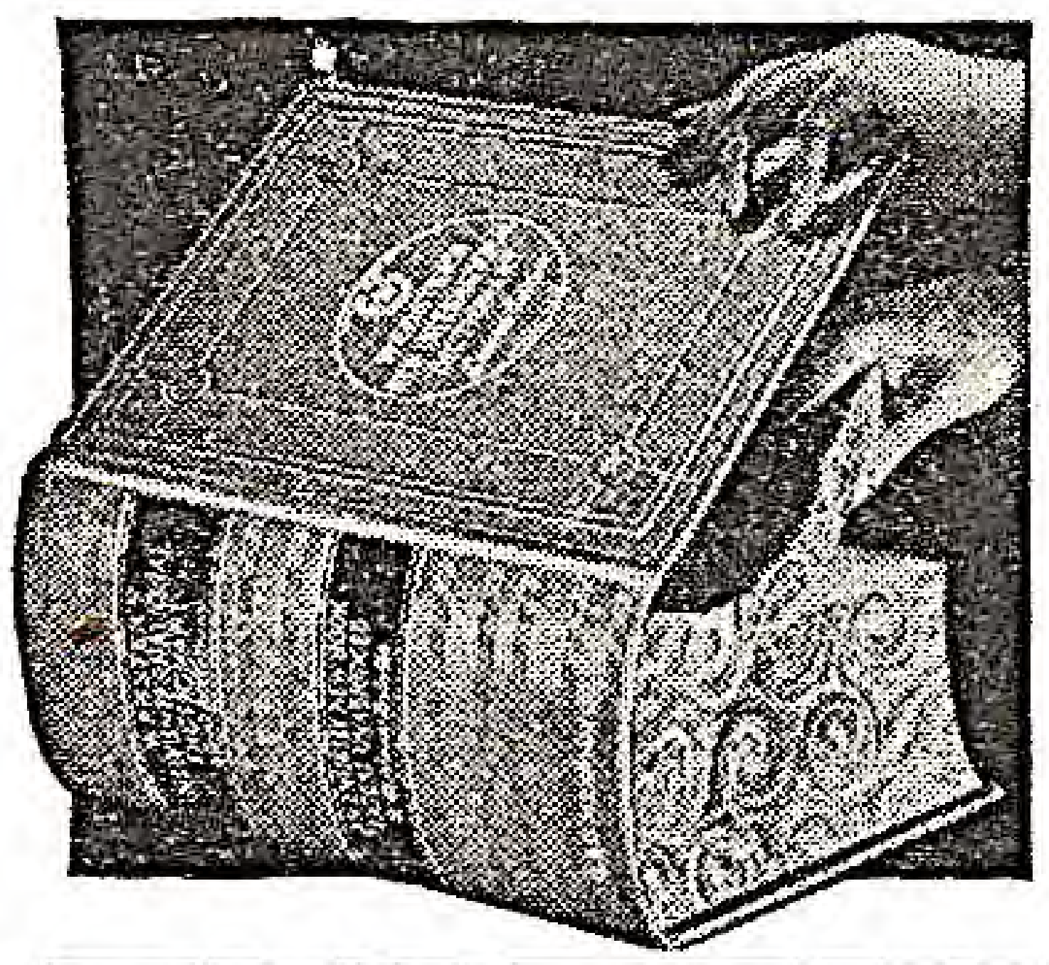

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Building the Model Mayflower

[*Continued from page* 109]

a hole in the hull to take this wire so that the main mast will rake aft one part and thirty. The fore mast rakes forward one part and thirty and the mizzen rakes aft one part and twenty.

Next month we can work on the chain wales, do some painting and raise the standing rigging. Between then and now, if you have some spare time, you might as well start the construction of the long boat. The dimensions are laid out in the plans. Make it from pine shaping the outside first. Then hollow it out so that you can see the light show through the wood, keep the same thickness throughout, about $\frac{1}{16}$ in. Build in the sail locker in the bow then put in the ribs. These may be made from fibre cardboard or wood. If made from wood, they will have to be steamed or soaked in boiling water. They are glued in place and held by common pins until set.

Next put on the gun wales and thwarts, which are the seats. The keel and stern post may be cut out in one piece by first bending the keel around the boat and then putting on an extra piece for the stern post. Then make the rudder and tiller. Pintles and small eye bolts are made from common pins or wire. It is not necessary to put on gudgeon straps. The wales on the outside may be made from rattan cans or whisps from your broom or some straight grained wood. By drilling small holes, the size of the wales in the stem and stern post where the wales meet this member, the strips can be pushed right through and then glued on. This helps hold them in place. Use pins and thread to help hold the wales in position. With a pen knife, scribe plank markings evenly on the outside of the hull at $\frac{1}{16}$ in. intervals tapering toward the bow and stern.

Fashion next the oars and masts. Lay the oars in the long boat and put the mast on brackets in a handy place in the bulwarks of the ship or lay it beside the hatch under the long boat. If you have made a good job on the long boat you will find it a decided addition to the model when lashed in place on the starboard side of the main hatch gratings.

With this work completed your *Mayflower* will rapidly be nearing the stages of completion. It is at this point where careful planning is required before cutting or installing delicate parts. In the next and last installment rigging of the ship and painting it will be described in full. For those who missed the first installment a back issue can be obtained at 20c postpaid along with a complete list of materials which is free if a stamped, addressed envelope is enclosed. Address your request to the Workshop Editor.

For safely, the deeper portion of a swimming pool should be lighted underwater, because overhead light will not penetrate more than about five feet when the water is roughened by the swimmers, explains a medical adviser.

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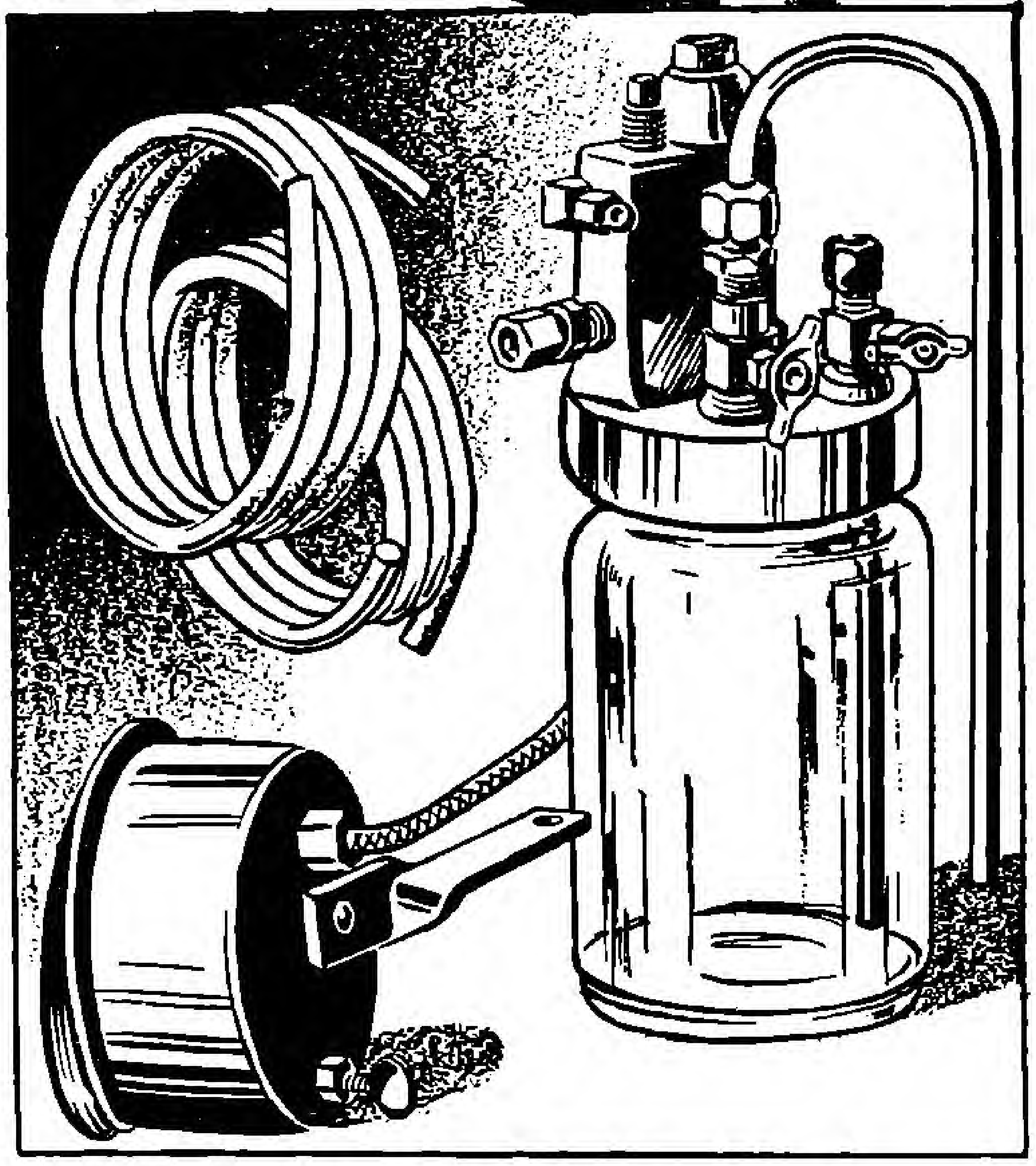

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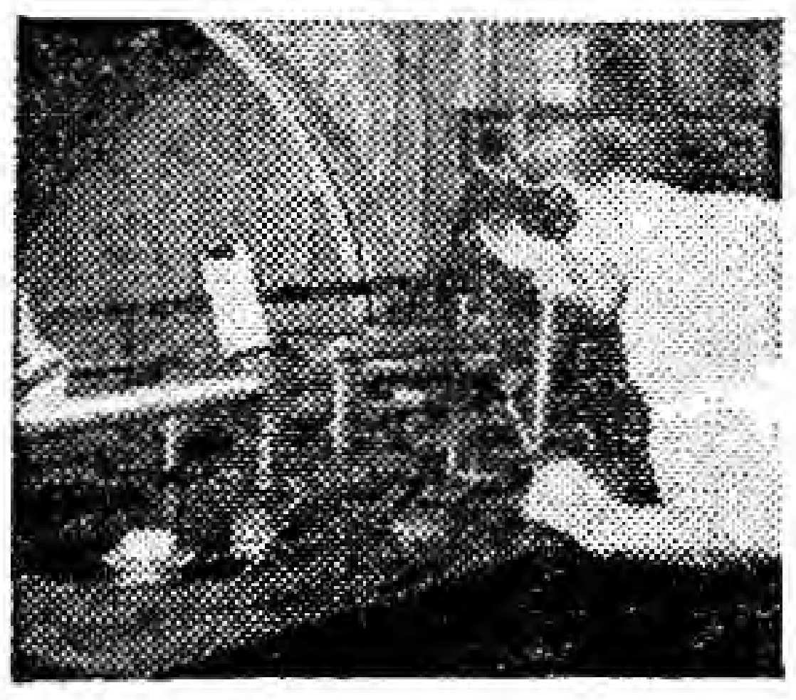

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Floor Plans For MM Model Homes

[*Continued from page* 71]

burning boiler with oil burner attached. Further discussion was gone into regarding the kitchen units, which are built of combinations of gas range, refrigerator and sink with metal cupboards above them. There are numerous makes, all of them good, and Tom's wife decided to go with Bill some time to see the various styles.

The kitchen floor, Tom's wife thought, should be finished in tile, but Bill suggested that due to cost it would be well to consider linoleum of a medium gauge; that it came in patterns of different designs and color, and that there was a large selection from which to choose. Tom's wife was slightly disappointed at the omission of tile but, when price entered, realized that she must make allowance for it. "Besides," as Bill explained, "the linoleum would look extremely well, and could be washed and polished if she desired."

As to the bathroom, Bill explained that tile could be used there, and suggested using alternate squares of black and white for the flooring. But what shall we use on the walls? "Well," said Bill, "again cost must be considered, and I would suggest a Keene's cement finish."

"Just what is that?" asked Tom.

"Why, it is a very hard plaster finish, which can be scored to look like tile, and afterwards painted with enamel paint in any color, shade or tint you desire."

Tom and his wife thought this would be all right; they could change the color of their tile at any time and by using a good make of enamel paint would always have a clean wall, besides which the enamel paint could be washed. Also Tom's wife could make some interesting waterproof curtains which come in lovely designs and patterns and would go with whatever color they painted the bathroom.

As to the bathroom fixtures, what did Bill have in mind? Well, an enameled iron tub with a rolled rim and apron would look very well; also a wash basin of the same material. This would be very nice, and cheaper than porcelain ware. He would also use a chain and rubber stopper, as they are very practical and no chance of getting out of order. The toilet could be of a low down tank type, and of vitreous china. However, we can go around to the supply houses and select, within our price, just the kind you would like.

"What sort of piping are you going to use? I've heard a lot about brass."

"Well, Tom, if you get a good brass piping you have a splendid investment. However, sometimes the price element enters, and a reliable galvanized iron pipe will give you excellent service. But on the other hand, some waters in certain communities create havoc with iron piping, and due to corrosion they have to be replaced. We will try specifying brass pipe, and if we have to cut anywhere, here is where something can be saved."

"What about floors, Bill?" asked Tom's wife.

[*Continued on page* 134]

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OF THESE TWO MEN
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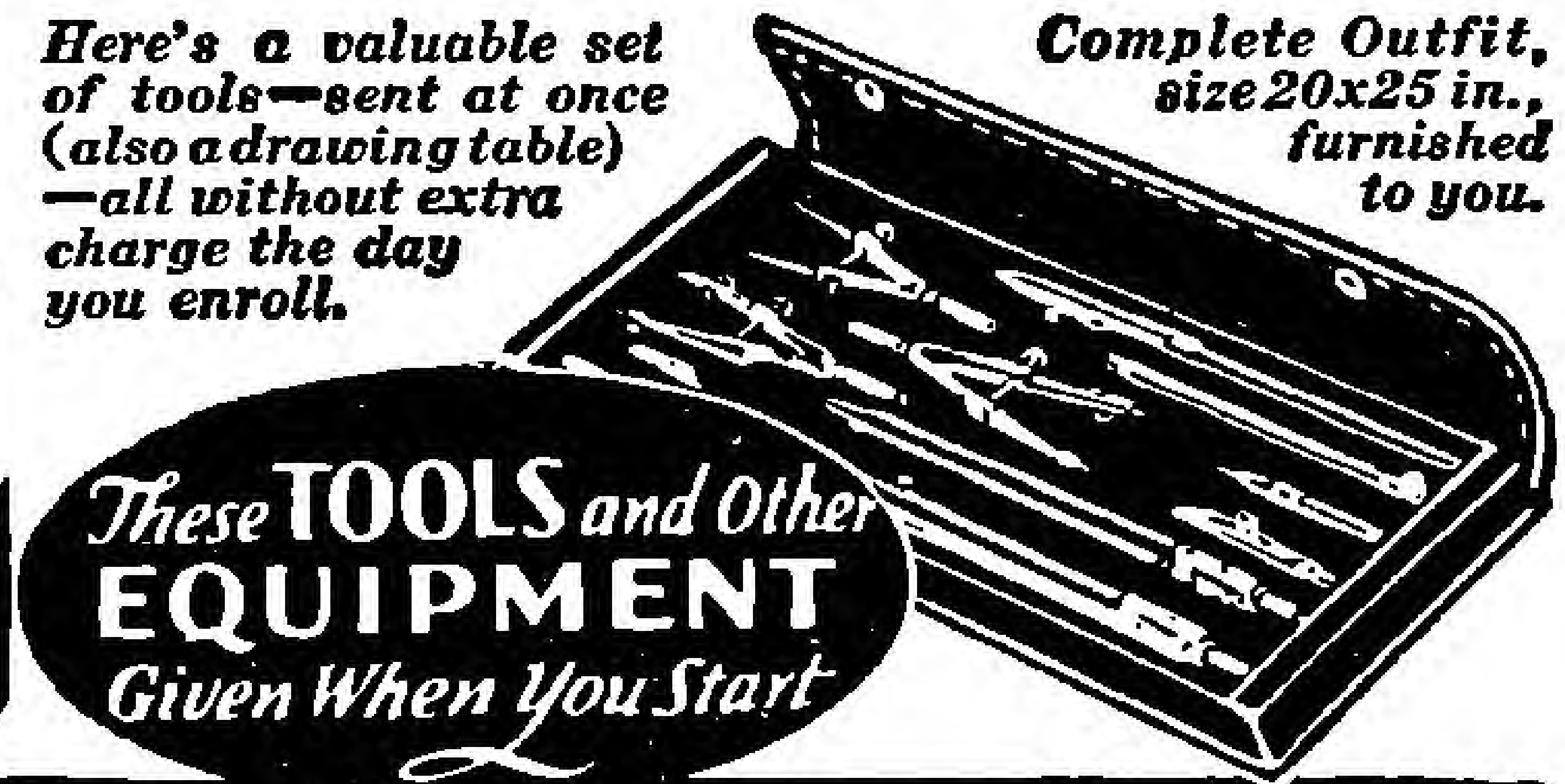

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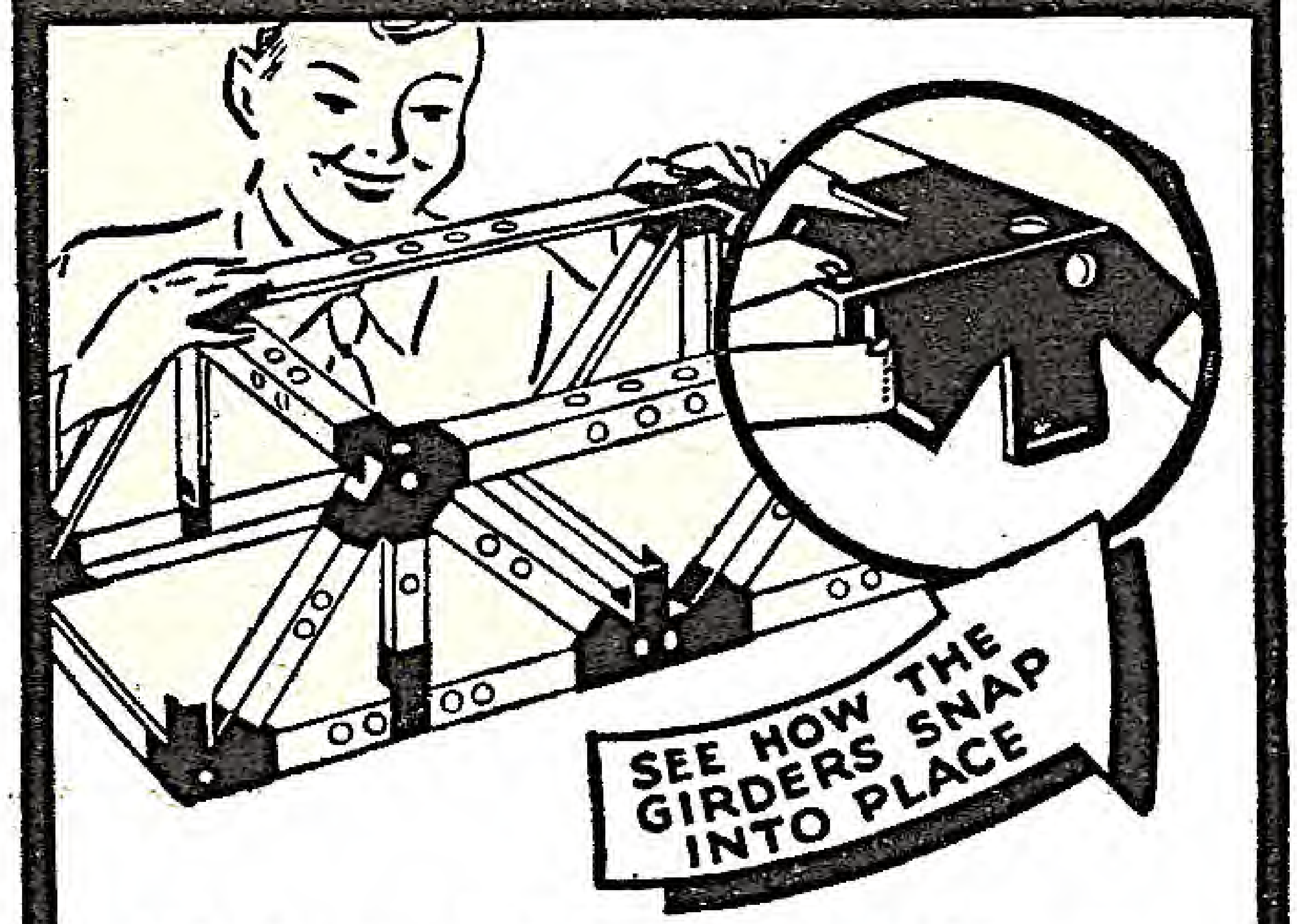
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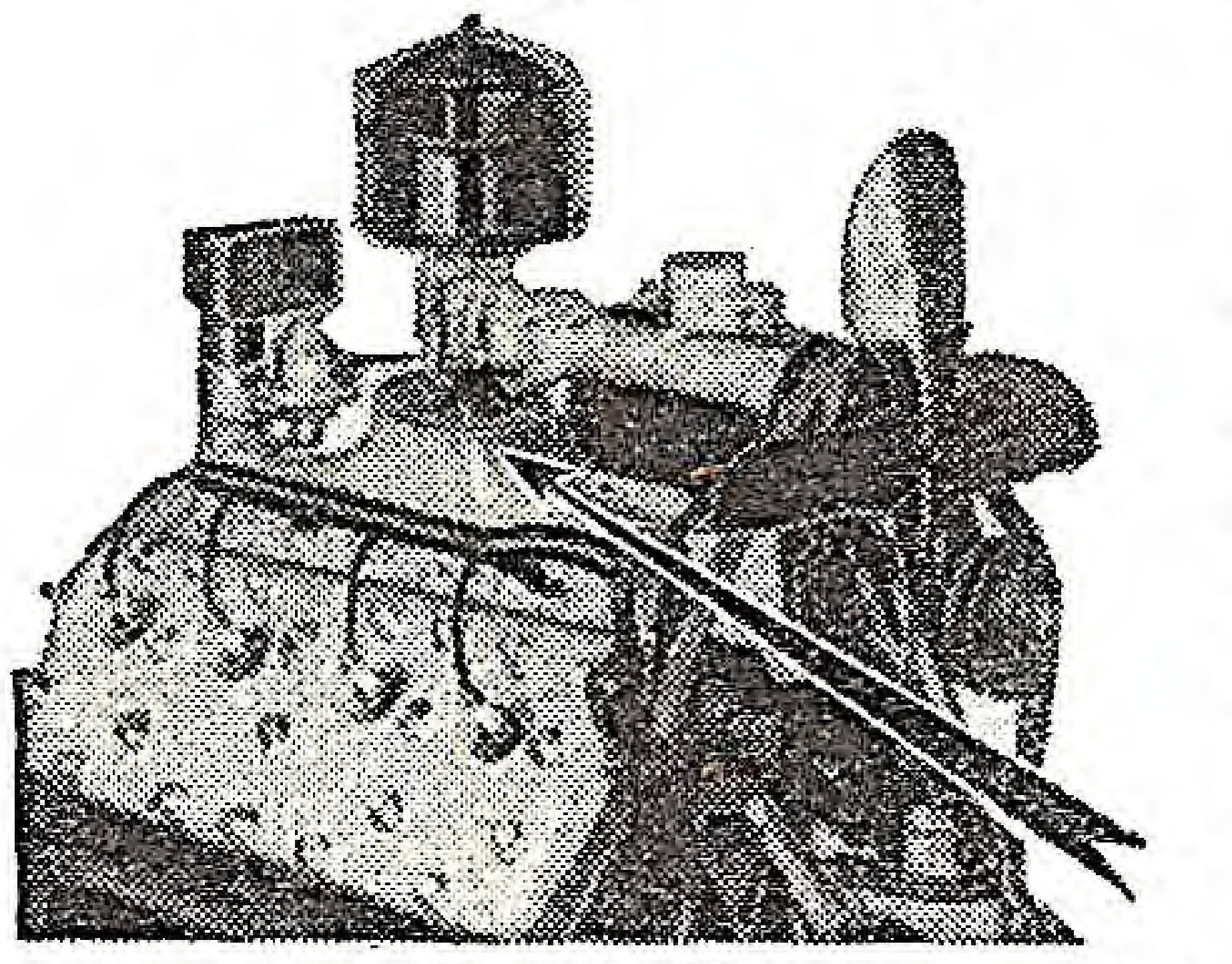

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Simple Gift Projects

[*Continued from page* 103]

queens, four bishops, four castles, four knights and sixteen pawns, then make small wood discs for mounting them.

After the figures have been mounted to the disc bases sand them smooth and apply the enamel finish; two coats being required. If a complete Chess Set is desired a playing board can be cut from plywood and laid out in squares, then painted either with red and white or black and white checkered blocks.

Today with the modern hostess serving all kinds of rarebits on novel hors-d' oeuvres such an article would naturally be a welcomed gift. The hors-d' oeuvres are nothing more than a stand provided with holds for holding toothpicks to which have been attached small pieces of cheese, pickles, candies or olives. Two such trays are described here and both can be made on the jig saw in a few minutes.

The hobby horse holder is cut from a piece of pine ¾-inch thick, painted with floral designs on the side to give it the "calico horse" effect and then mounted on two rocker bars. After cutting out the horse sand down all rough edges and paint it white. The floral designs can be either red or blue.

The sailboat holder is equally attractive and cut from the same stock as the horse. The sail is mounted on a carved or scroll sawed hull block which in turn mounts on a base to represent water. In making these holders lay out the square pattern profile and trace it on the wood so as to avoid mistakes. Both holders will make worthwhile gifts.

How To Use Decoys

[*Continued from page* 87]

add six more decoys, making a 6-5-4-3-2-1, or a 21 decoy set plus the six dipper decoys. The southern hunter always carries the advantage with a large display of decoys. Out-decoying the other hunter is one of his main tricks.

For rice beds where no open places are found, I carry a small scythe in the boat, and with the scythe I cut an opening for the decoys to be clearly seen. This I term "pothole shooting." Here I place my decoys in a different setting. The anchor strings are changed so the decoys will be facing in every direction. The decoys are not set in formation or so close together. The dipper decoys are scattered here and there amongst the decoys, giving the feeding effect to the set. This becomes a very good set for pothole shooting.

Do not make the mistake of using these dipper decoys in your set for the diver or lake ducks. They do not dip for their food but dive for it. A decoy set for the diver class of ducks should be like the fifteen decoy set of the dipper class minus the dipper decoys.

The anchor string should be so fastened so all

[*Continued on page* 134]

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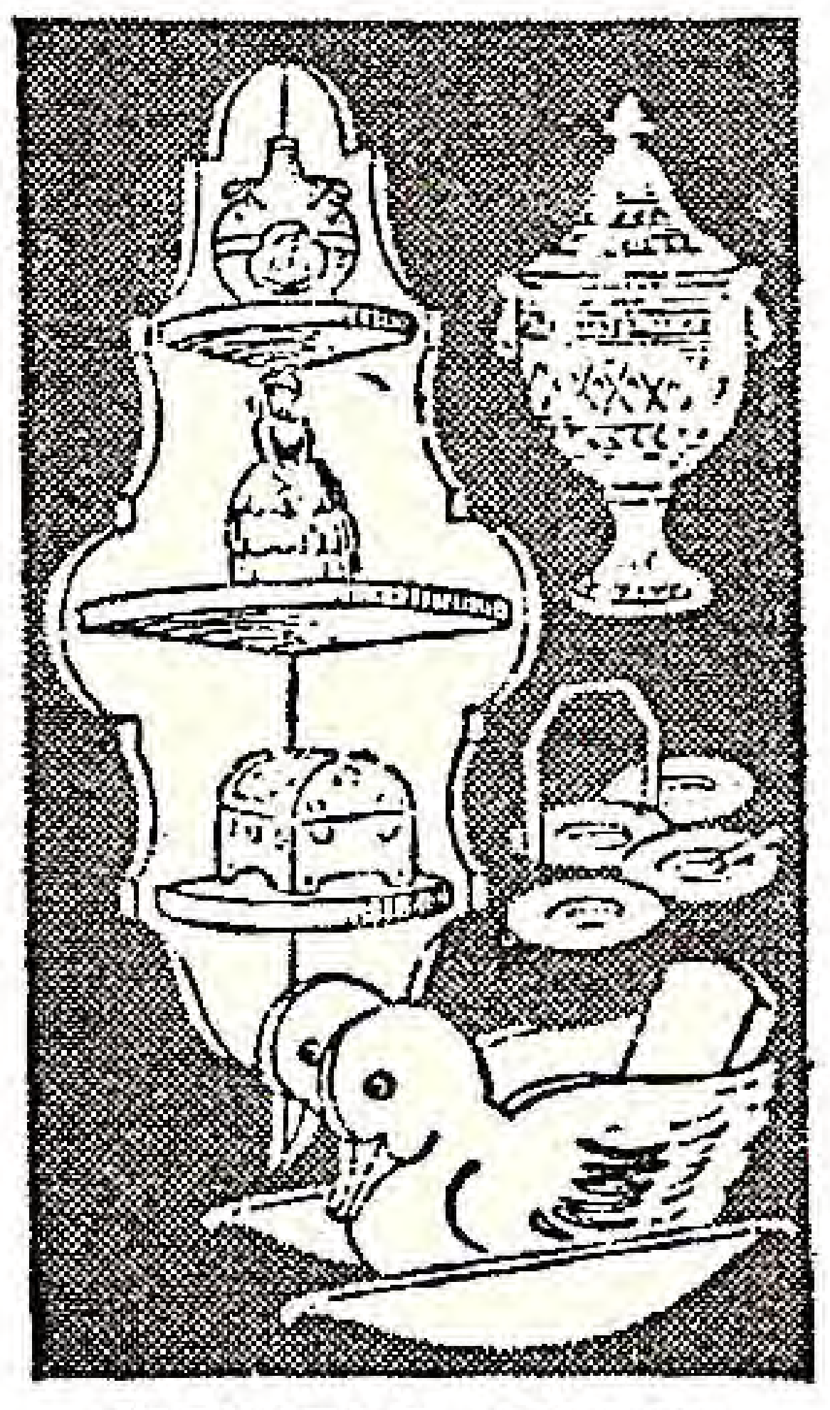

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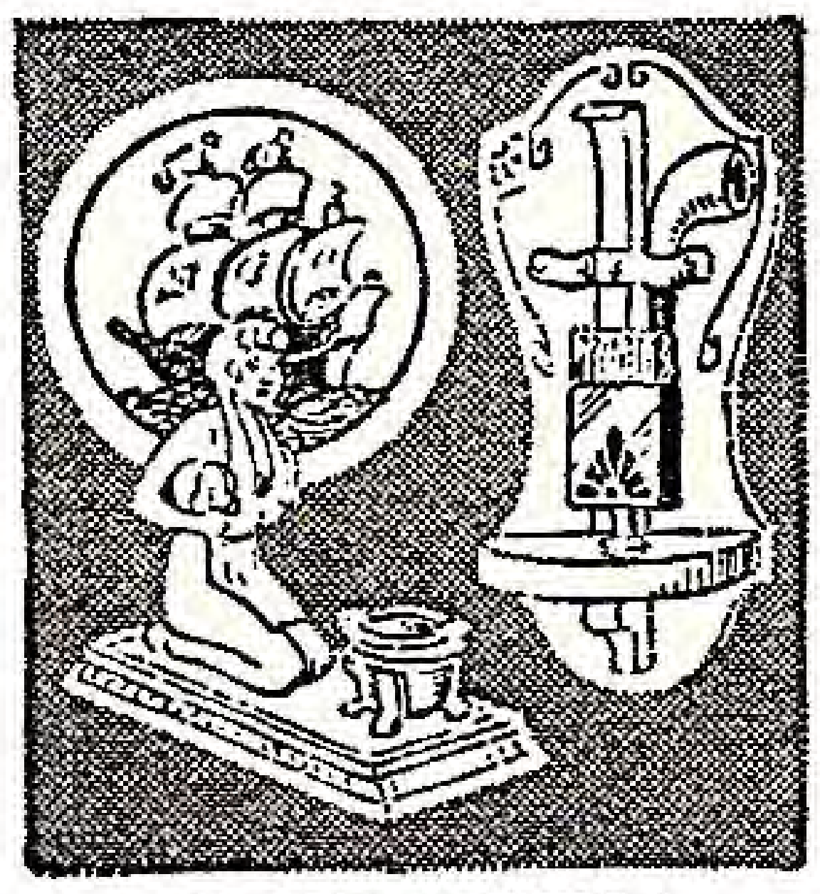

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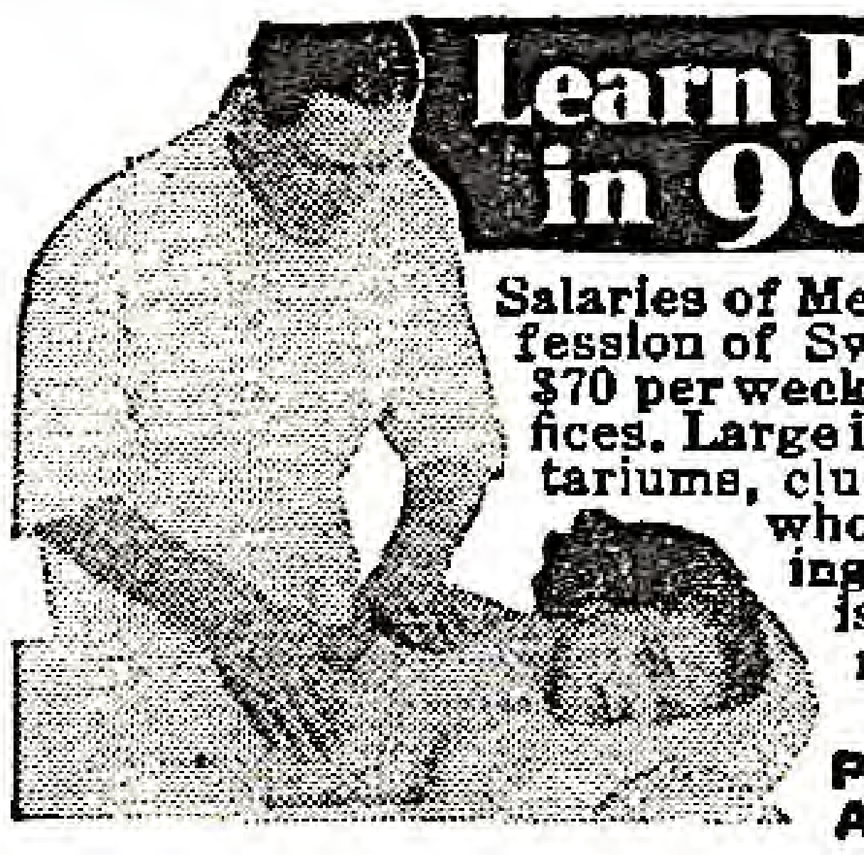

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How To Use Decoys

[*Continued from page* 132]

decoys face into the wind, with the exception of the pothole set. If you have a point that acts as a pass, with water on both sides of the point, two sets of decoys may help. On the quiet side place the set at the usual 35 yards, but on the windy side the decoys should be set out 80 to 100 yards. This may draw the ducks in onto the point on a winging shoot. It is advisable in most cases to use just one set of decoys.

In locating a set for the decoys, the hunter must bear in mind that the decoys must be set in direct wind from the blind, the triangle or number one decoy points straight into the wind towards the blind, as the ducks always come up to the ducks against the wind, making correct shooting for the hunters in the blind. Always avoid setting the decoys so that they require side wind shooting. This set spoils the effect of the call, as the ducks will notice that the sound of the call is not coming from the decoys but from the blind. It also makes hard shooting.

In setting your decoys for the dipper or the diver classes of ducks, it is well to remember that the dipper class of ducks always alights short of the ducks in the water and swims in. The diver class passes over and alights ahead of the ducks in the water. This becomes important as to the distance your decoys should be set from the blind. For a decoy set for the dipper class of ducks, the outer row of decoys should not be out over 25 yards from the blind, as they always alight short of the decoys. For the diver class, the decoys should be out 35 yards, as they would pass over the decoys before alighting. This does not mean that you should shoot at the ducks on the water. It means, if your decoys were out 35 yards with the dipper class, they would alight before coming in range.

Floor Plans For MM Model Homes

[*Continued from page* 130]

"Well, there are several kinds of floors—oak and North Carolina pine hard grain flooring are most used for private homes; in the bedroom pine flooring is cheaper, and if you use carpets is easier for fastening the carpet. Sometimes we specify pine in the bedrooms and oak for the living room and hall. But let me suggest that we might use, again due to cost, pine in all rooms except the living room and entry. There we can get a fine effect by using a wide hard pine board floor, and that will give you an interesting floor for your main rooms. Of course, in the kitchen we will have to use a hard pine flooring, and have it planed and scraped, because the linoleum requires a smooth underflooring to lay properly."

How about the walls, asked Tom's wife. Bill was sure they would like a rough plaster wall for the living room. However, Tom's wife liked wall

[*Continued on page* 136]

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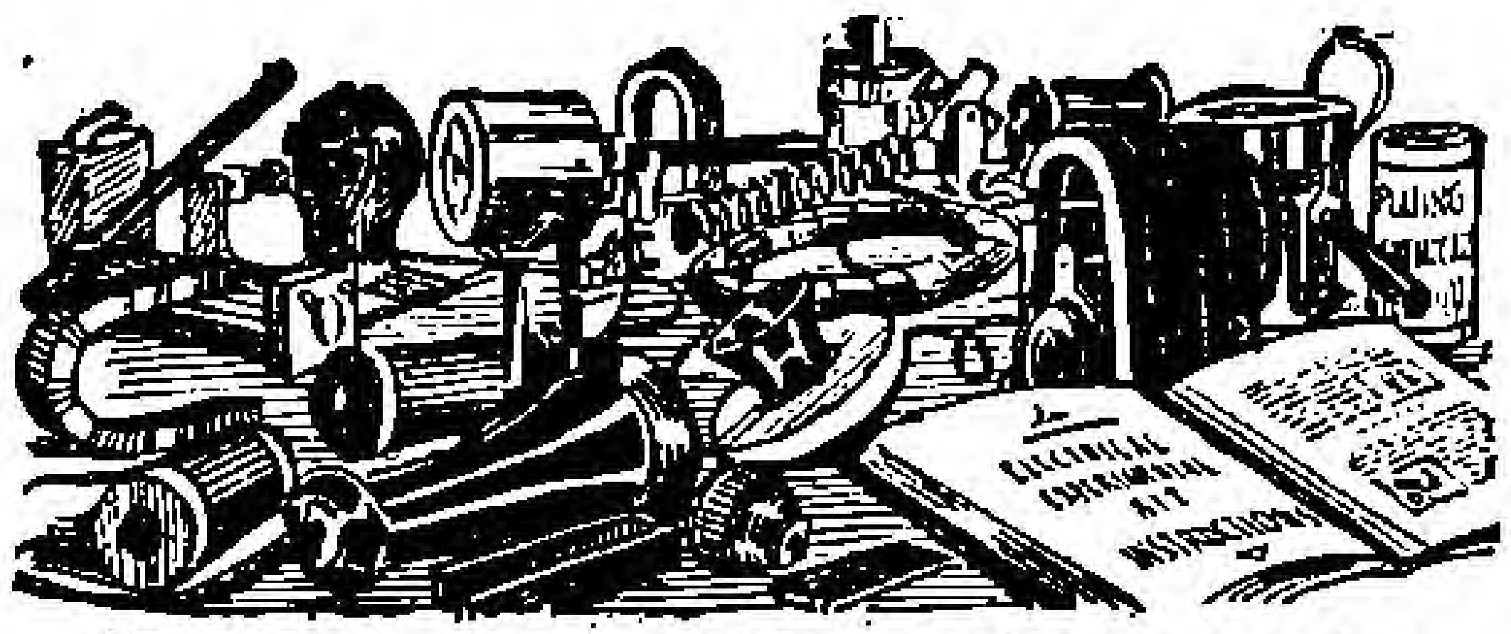

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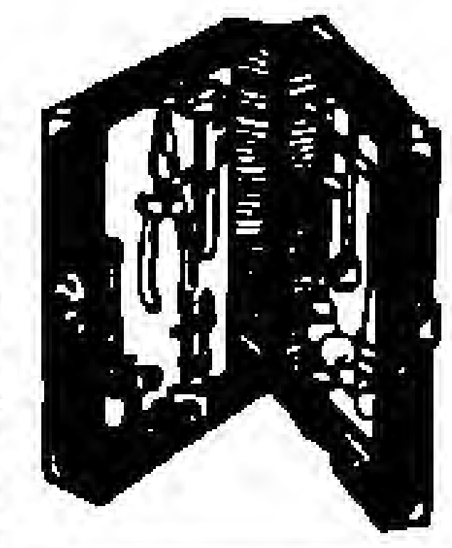

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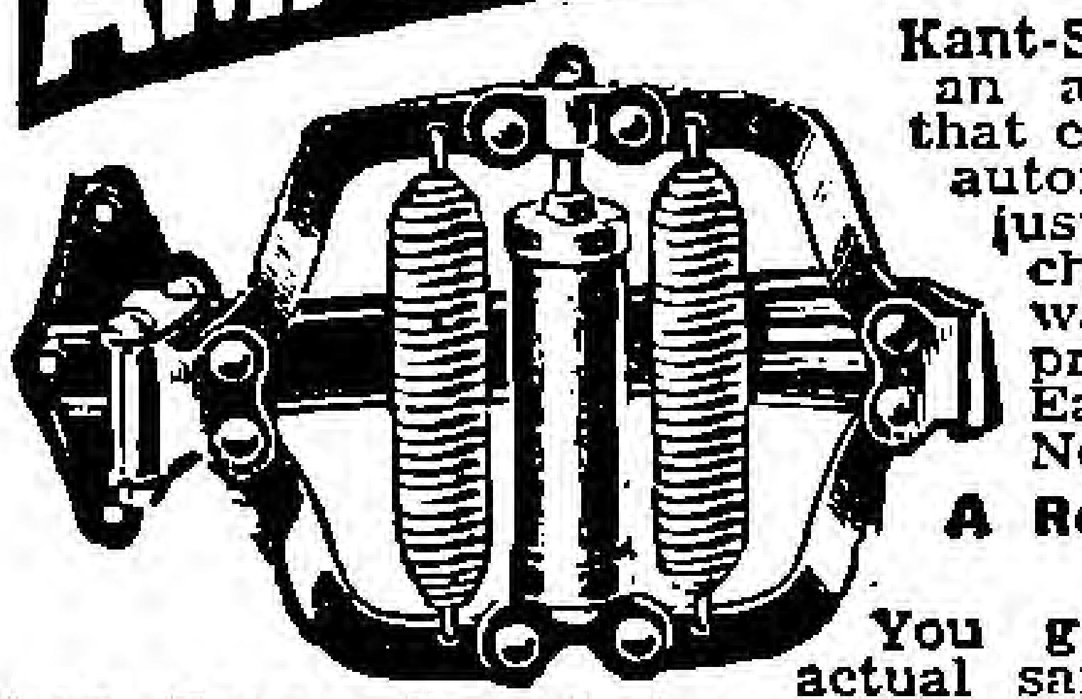

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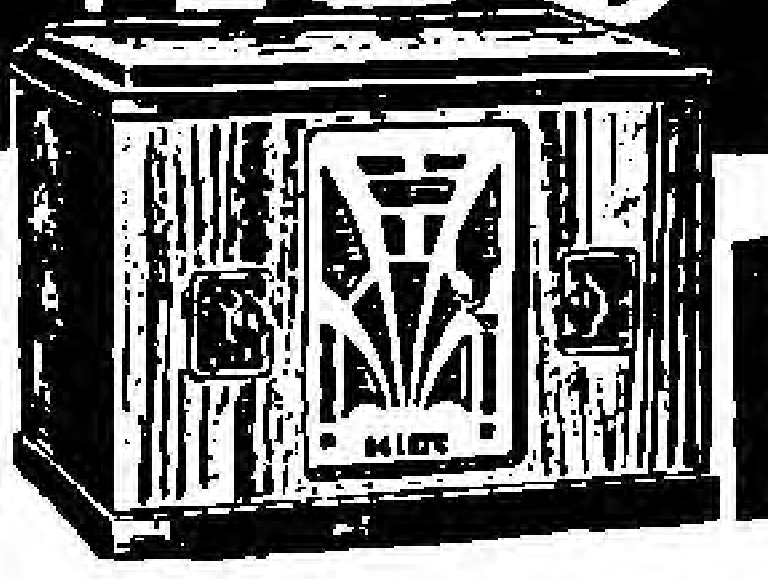

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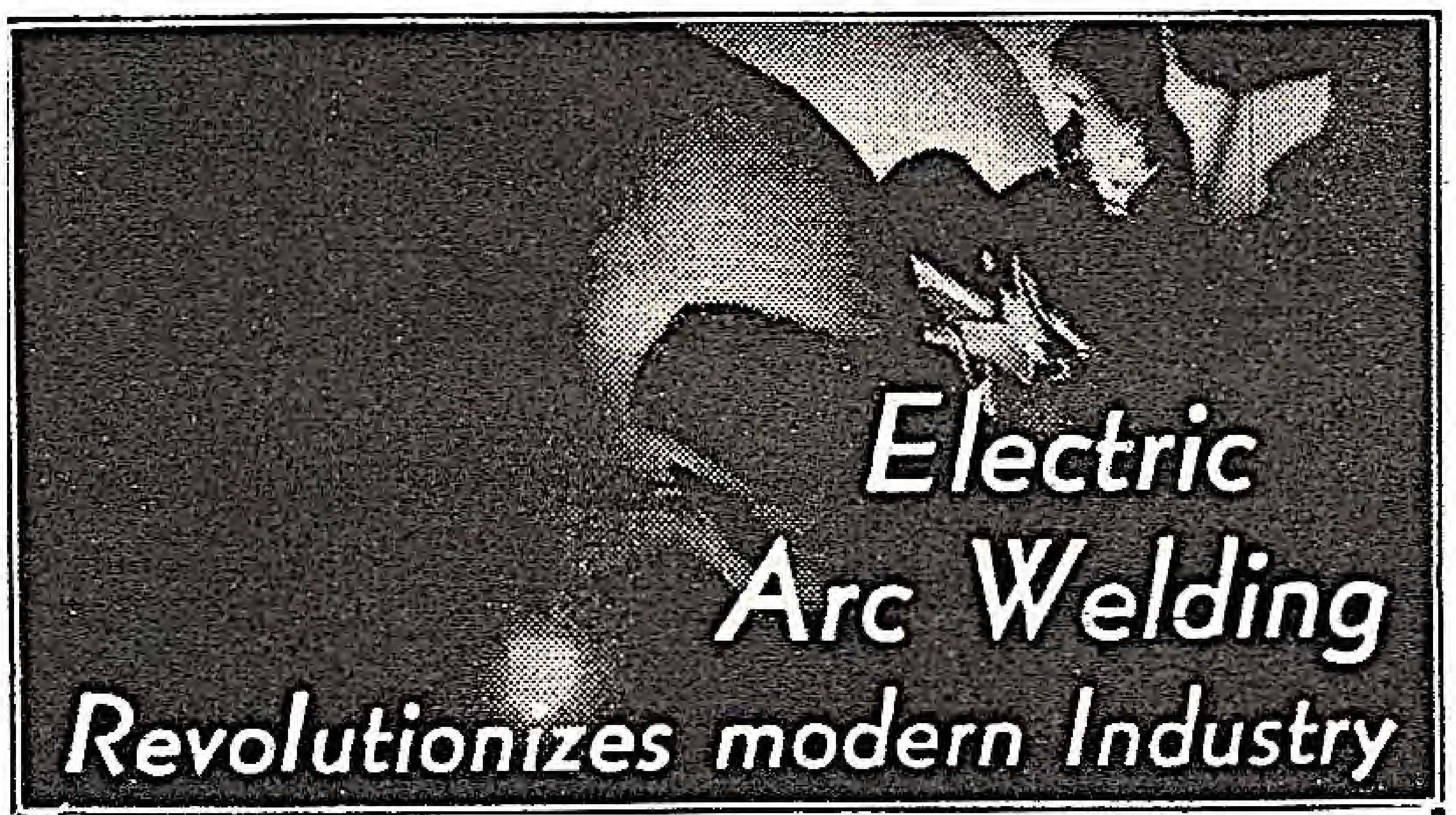

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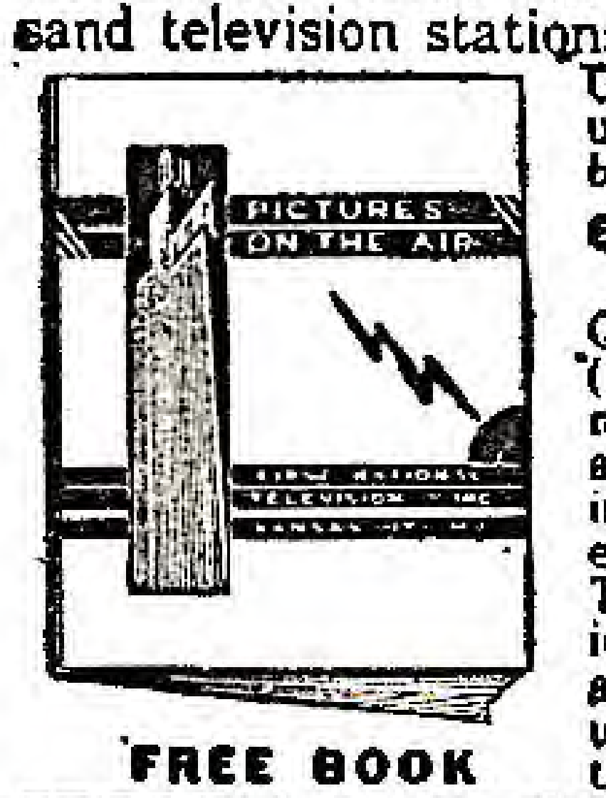

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Floor Plans For MM Model Homes

[*Continued from page* 134]

papers, and could she have wallpaper for the bedrooms? Most certainly she could. So a smooth white plaster wall would be used for the bedrooms, closets, passages and kitchen. The kitchen walls could then be painted with enamel.

Bill suggested that when the plans were almost completed they have another and final conference. They could then go over the plans and an outline specification, check any items that might not have been discussed, and have everything incorporated in the final drawings and specifications.

After Tom's conference Jim and his wife were called, and they likewise were carried away with their six-room home. Behold, there was the bay window Jim's wife was so anxious about; right in the entrance hall, just off the dining room where they could sit and looking through see her flowers. And what were those funny little things with black spots in front of the dining room, marked "a grille." Why, it was a wood partition, panelled up six feet in height, and opened above with turned baluster set in this opening.

Bill said the boss was planning to build both houses with regular beam ceilings on the first floor, as it would add a lot of interest to the rooms, and also help to keep the cost down. Jim's wife asked why the porch was in the rear instead of across the front of the house. Because a porch is where one likes to live during the Summer, and located in the rear affords more privacy. It also overlooks the rear garden, which can be developed, and become a part of the whole scheme of living. On this porch you can have all your meals; it being almost as convenient as the dining room, because of the door direct from that room to the porch.

While Jim and his wife were fully satisfied, Bill insisted that they take the sketches home, and study them in every detail, bringing them back with any suggestions they might have. In the meantime Bill would start their working plans.

"When will you be ready for estimates?" asked Jim. "In about two or three weeks," replied Bill. "And how long will it take before we know the final cost to build the house?" "The contractors will require a week or ten days to give you an intelligent estimate. In the meantime we can arrange to go to the Building and Loan Association, or any lending institution with our plans and arrange for the financing." "This is all very exciting and most interesting," said Jim's wife. "One must get into terrible jams, if they tried this sort of thing without professional advice." "I guess they do," said Bill, "for so far we are just beginning." "I can't wait until I see the estimates," said Jim's wife, "it will be like opening Christmas presents, or birthday gifts."

We leave Jim, his wife and friends until next month when they receive the surprising estimates from the contractors. Don't miss the next issue of Modern Mechanix Hobbies & Inventions so you, too, can learn just what the estimate was.

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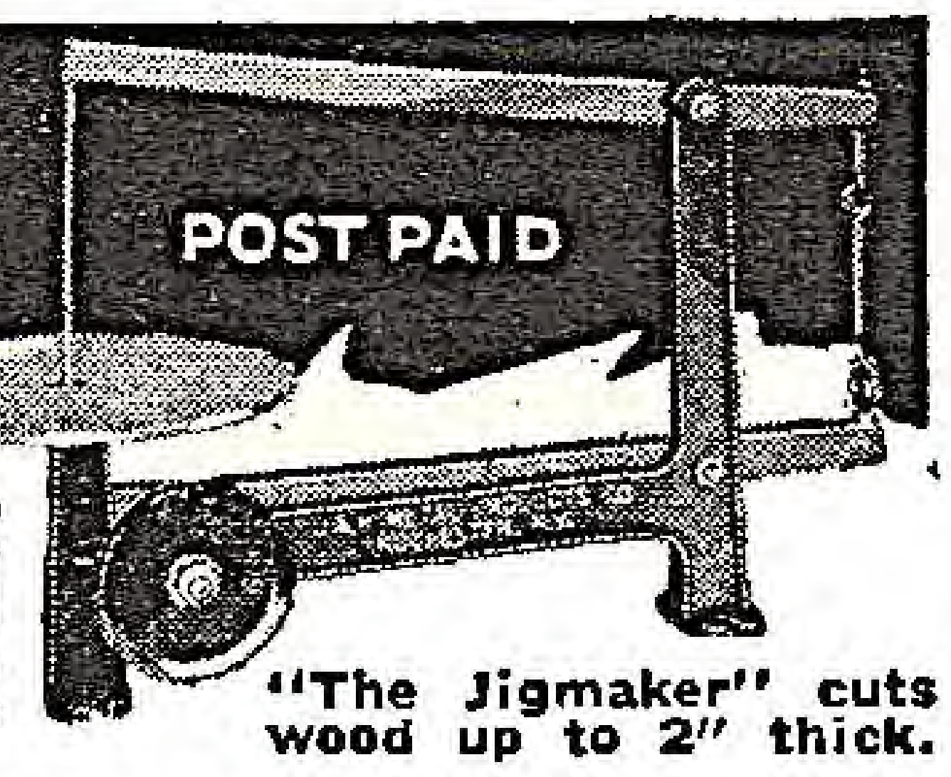

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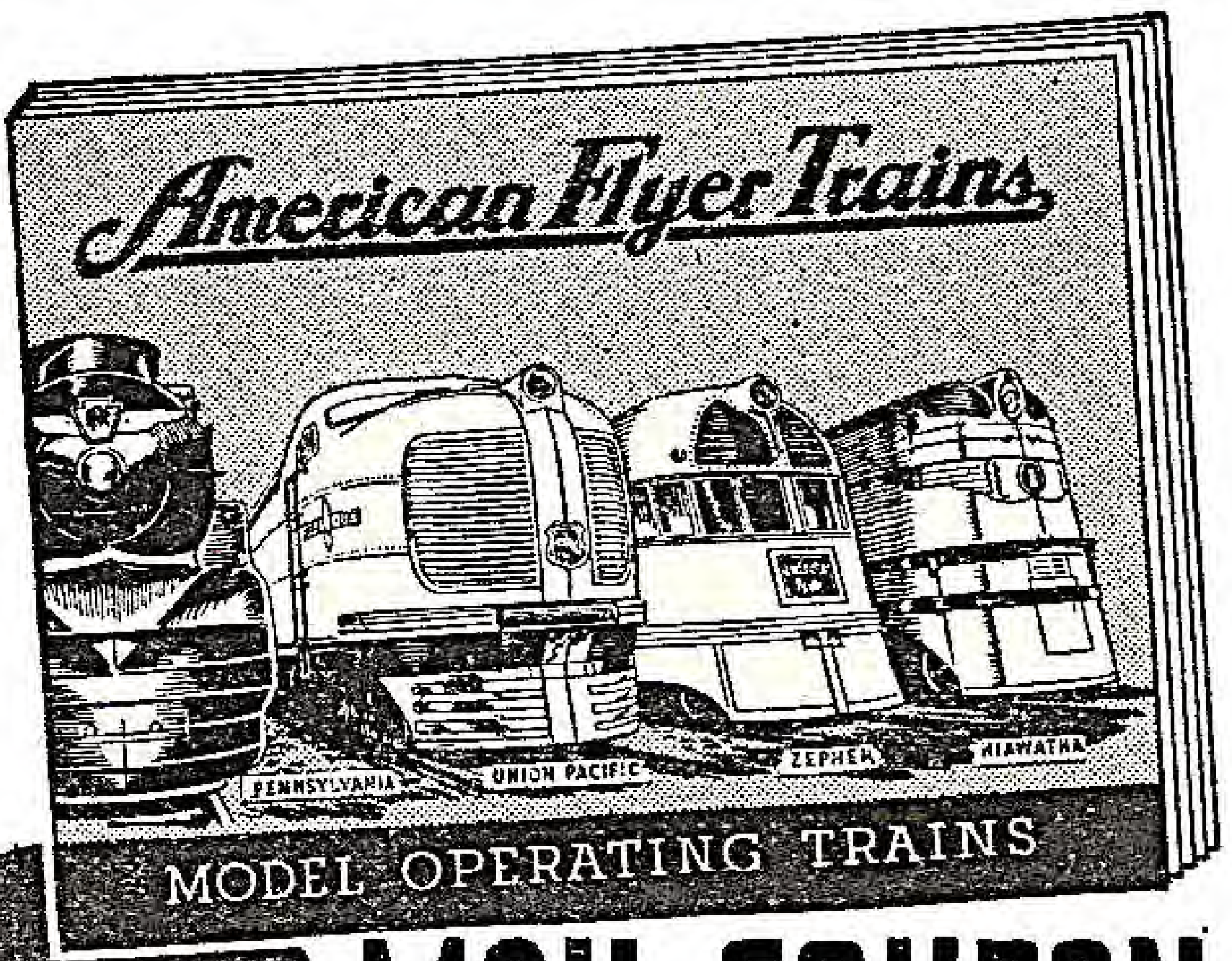

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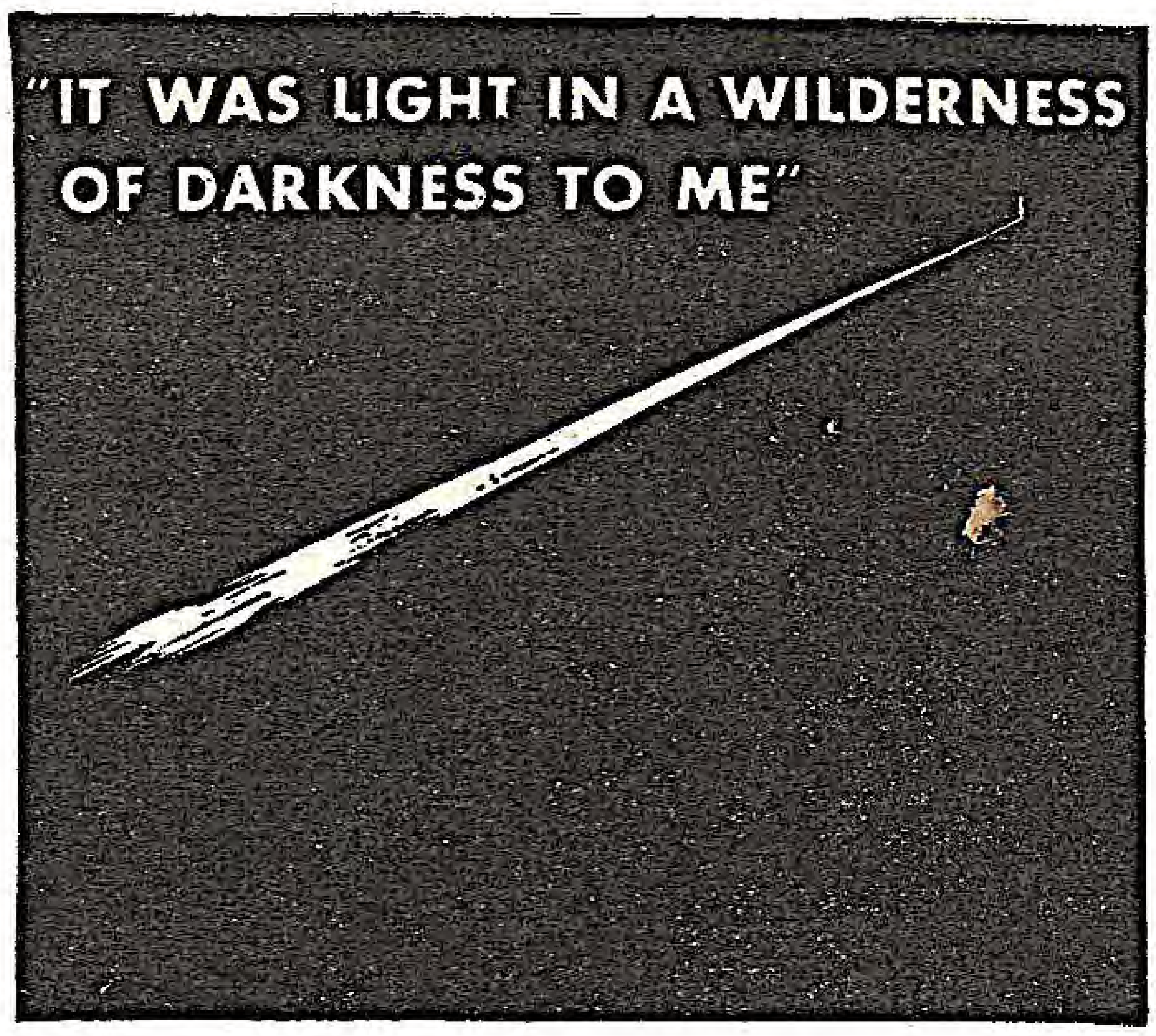
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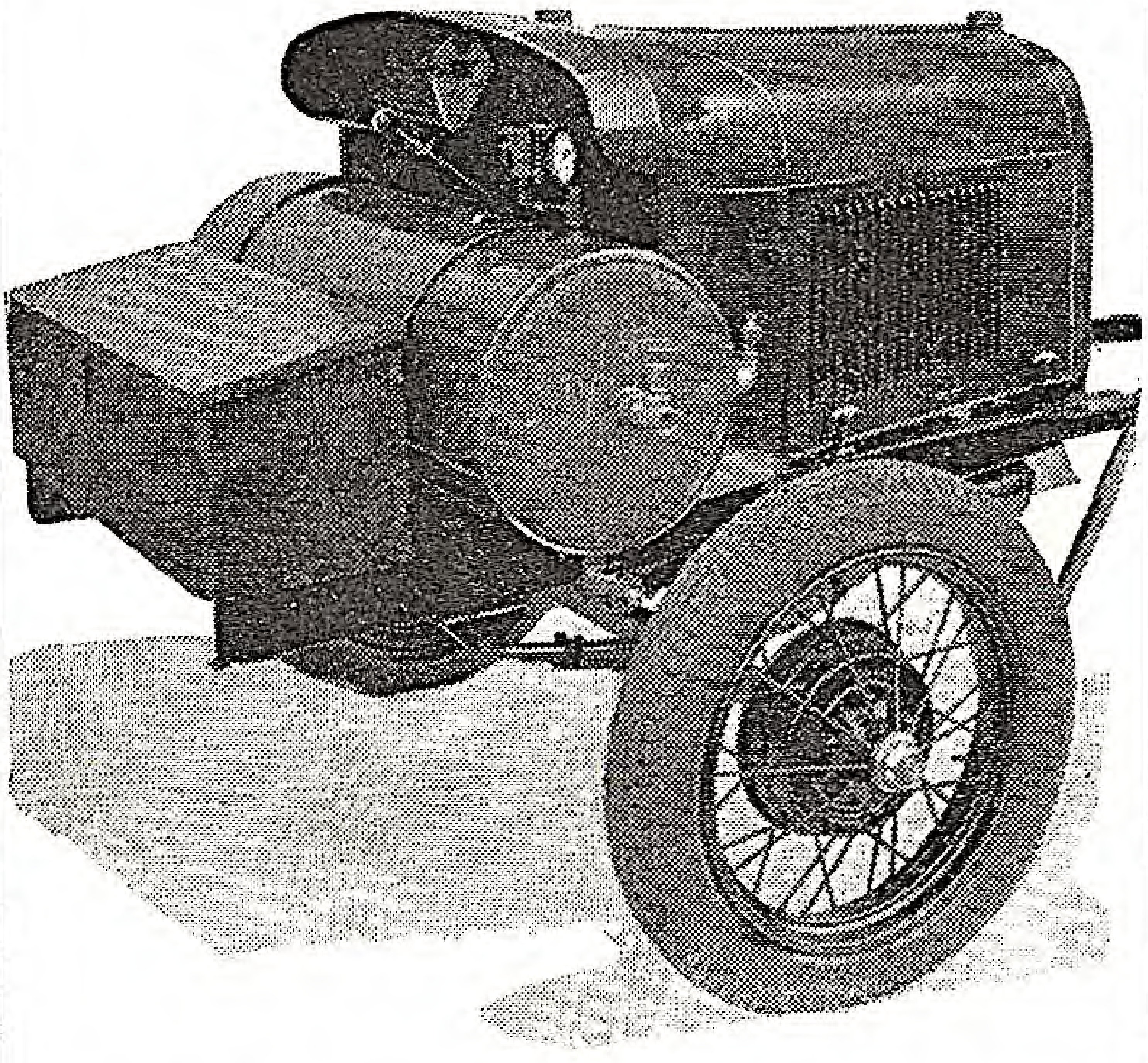

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Methods Of Deer Hunting

[*Continued from page* 124]

still to recommend any such small caliber rifle for deer hunting is utterly out of the question. The same is true of the various medium-power rifles such as the .25-20 and the .32-20. In the hands of experts, who invariably shoot for the head at comparatively close range, a rifle of the sort may work to advantage. Whether the average hunter could use the rifle effectively is another matter, for the amateur or average deer hunter never shoots for the head, but invariably at some portion of the body. Added to this, most hunters want to preserve the head for mounting. In this case a bullet would harm it.

The chief and foremost fault with medium-powered rifles is the fact that they drill a hole into the body of the deer that is about the size of a pencil. So small is this hole that it at once closes up, as the result of which the animal may bleed internally, but none is discharged. Added to this, even though the deer is shot through the lungs with a medium-power rifle, the animal is likely to run for many miles before dropping.

What is needed is a high-powered rifle using a bullet that has a shocking and tearing power that will bring the deer down. It will be found that the proper bullet for a rifle of this type is the open-point, expanding, high velocity type, which has the power and shock to kill. Suitable guns for deer hunting in this class are the .30-40 Krag, the .250-3000 Savage and the .30-06 Springfield. Needless to state the .30-30 has been a favorite with deer hunters the country over for more than a half century. Indeed the statement has been made in many quarters that more deer have been killed with the .30-30 than all the other high-powered deer rifles put together!

Too many hunters kill one another instead of deer. For this reason every one is urged to carry binoculars hung across the chest, ready for use at all times. A glance will tell what is moving in the bush ahead. It often may be a human being.

Another habit amateurs should adopt is not to spray the landscape with lead in an attempt to take a deer hot-footing it over the windfalls. It is dangerous to other hunters, and the deer is seldom hit anyway.

A wrist-watch type compass with luminous dials for both day and night use is essential. If you are not apt at using a compass, do as little wandering as possible.

Do not carry a deer out on your back. Every season someone tries this and is drilled through as a result: another hunter sees only the deer, and shoots.

Be careful not to rush a deer when he's down. Many a buck has come to and turned on the hunter with fatal results.

A last tip: Too many hunters carry whiskey and are half drunk all the time they are in the woods. Leave whiskey home. Only the clear-eyed, wide-awake hunter gets his deer.

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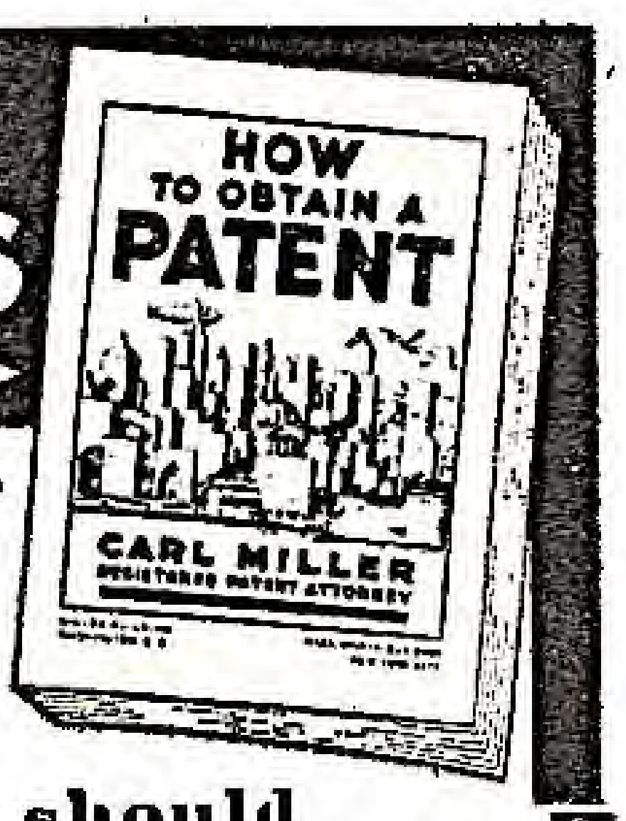

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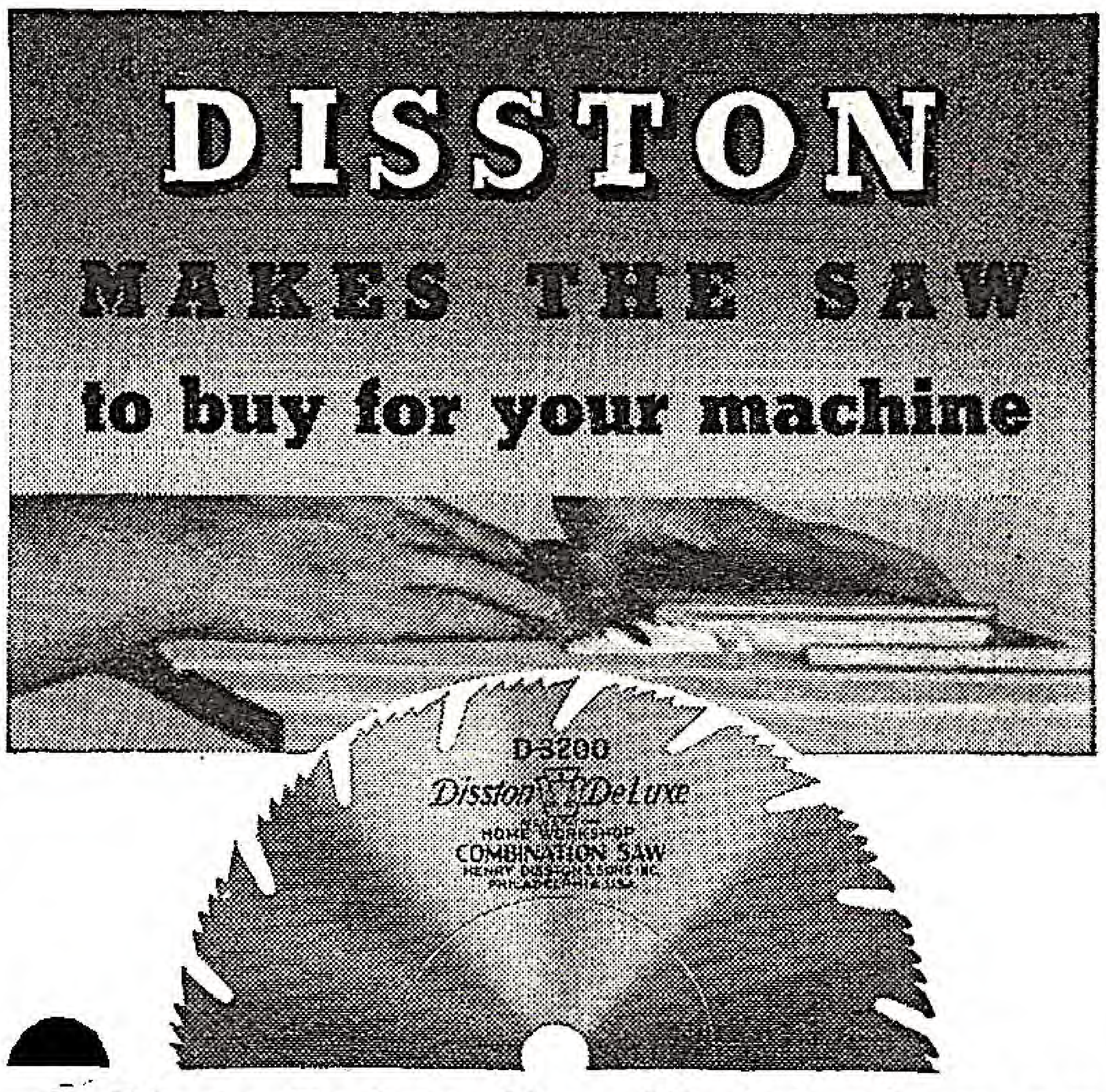

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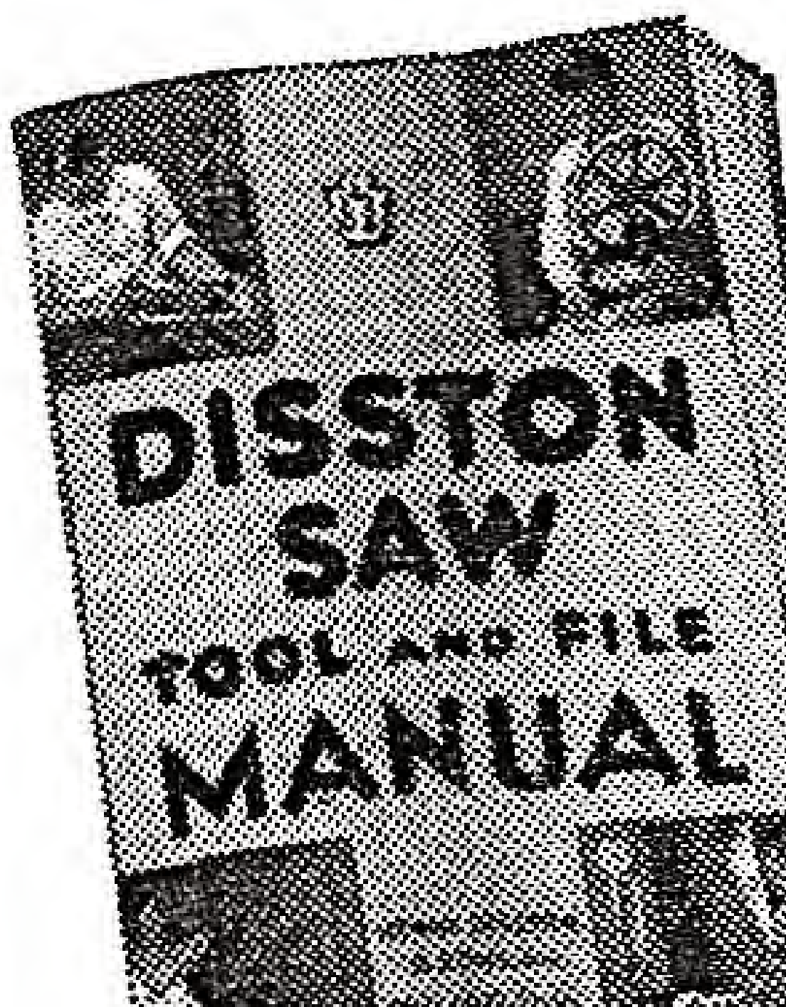

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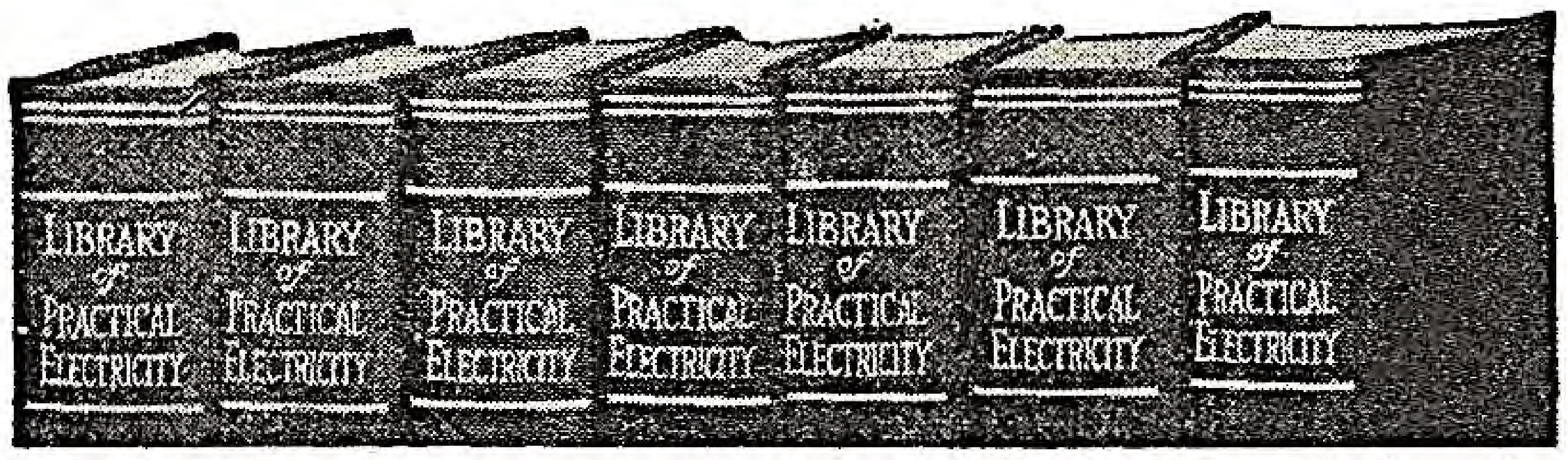

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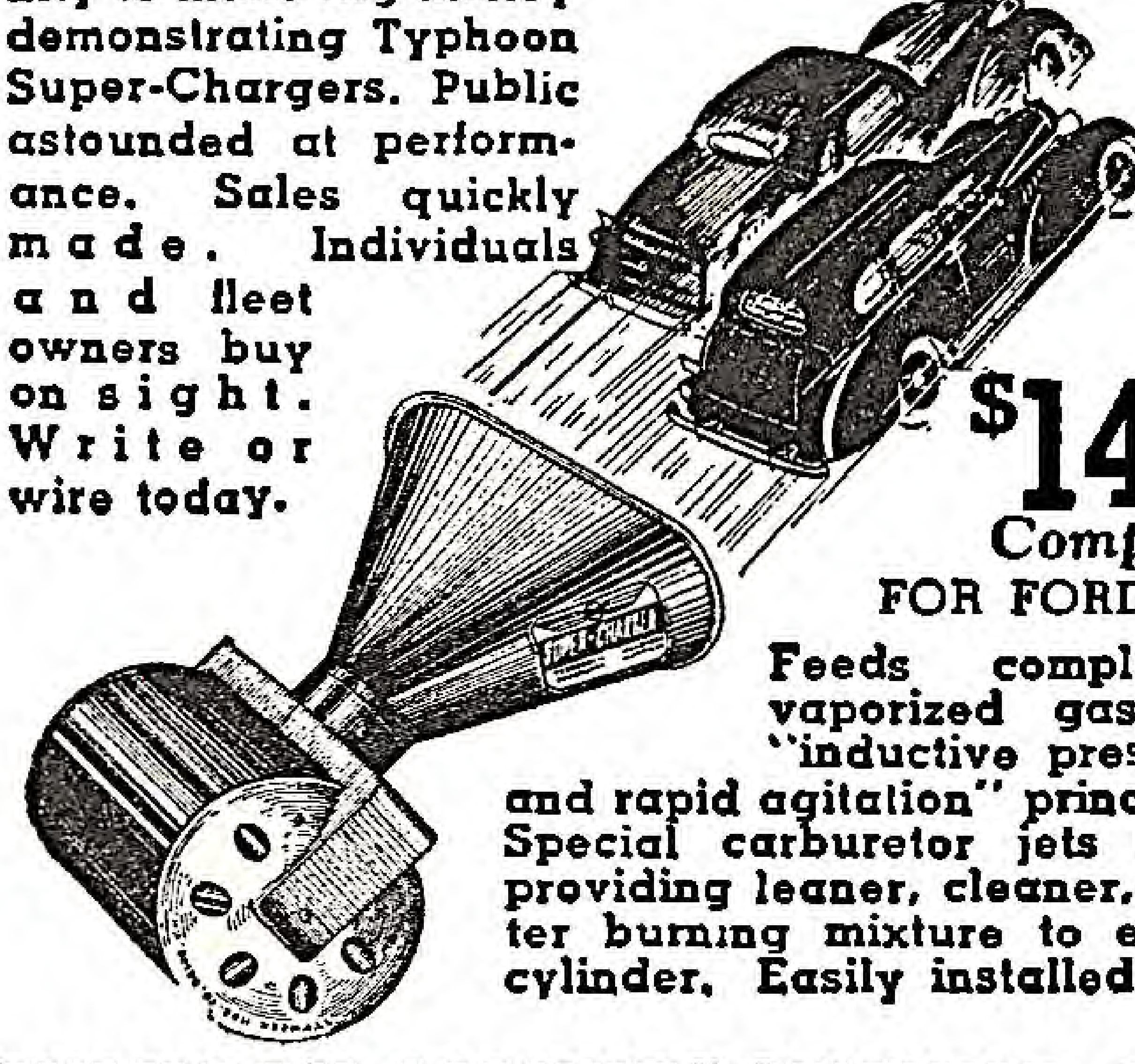

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Trailers for Next Year

[*Continued from page* 47]

toward supplying the trailer owner with a product comparable in safety, durability and satisfaction with the highly perfected all-steel body of the modern car.

Entry of the automobile makers into the new field also marks the end of the individualistic manufacturing methods that have, by and large, prevailed. With the adoption of the mass production methods that made the automobile possible the trailer industry seems well on its way toward its 1937 sales goal of 200,000 units.

The 1937 trailers are greatly advanced. They are fitted with better hardware; interior trim is now comparable to that in the finest automobile bodies; electrical systems are more nearly in line with the demands of trailer living. Galleys show the result of much experimental work and more nearly reproduce the cooking conditions of a modern kitchen than a hunting camp.

Water that flows from a faucet has replaced the sump pump in all but a few 1937 trailers. It is furnished from a storage tank that operates under pressure from a compressed air supply. Toilets have likewise been improved and showers are standard on almost all of the new de luxe jobs.

The fact that women have a great deal to say about all trailers except those operated for commercial purposes or owned by misogynists, has resulted in a vast improvement in the quality and appearance of trailer furniture and fittings.

Mrs. America wants to make her traveling home look as much as possible like the domiciles pictured in the women's magazines and the manufacturers are doing their part to aid her. One manufacturer this year is offering upholstering in 17 standard materials.

Trapping Enemy Spies

[*Continued from page* 39]

room. Its double-doors lead to a real "black chamber" with walls covered by blackboards, which in turn are covered by numbers and letters. Those cabalistic symbols are used by the piercing-eyed genuises of this secret cabinet, to break the messages of spies in our midst; messages on which may hinge life and death, safety and danger, peace and war. To read them, the patient cryptanalyst's greatest aid is his frequency tables, showing which letters and words are most commonly written in English.

The usual order of letters in "American" is: E T A O N I S H R U D L C F M P W G Y B V K X Q J Z.

Exhaustive studies have shown, too, that in any message, about 15 per cent of the letters will be E, only 2 per cent K, X, Q, J and Z together. Also the TH, HE and ER are combinations often found, that U is seldom found doubled, and other

[*Continued on page* 142]

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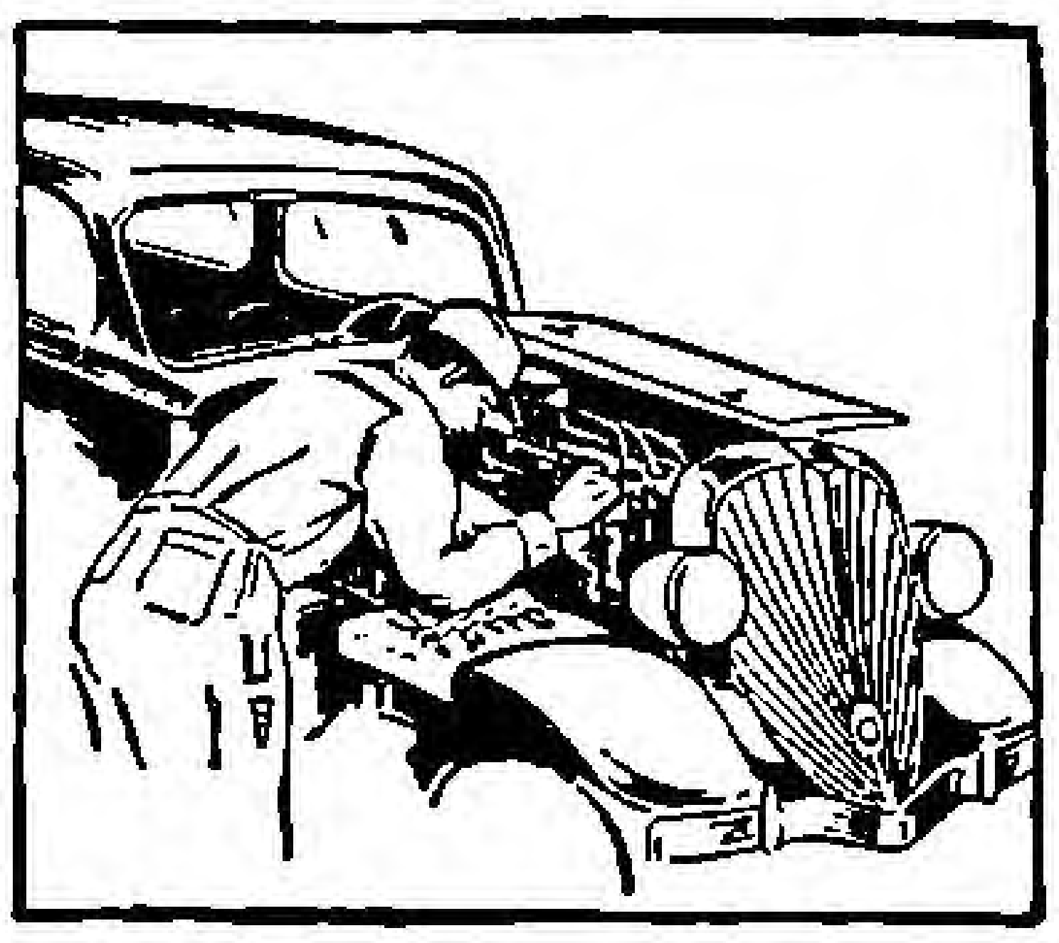

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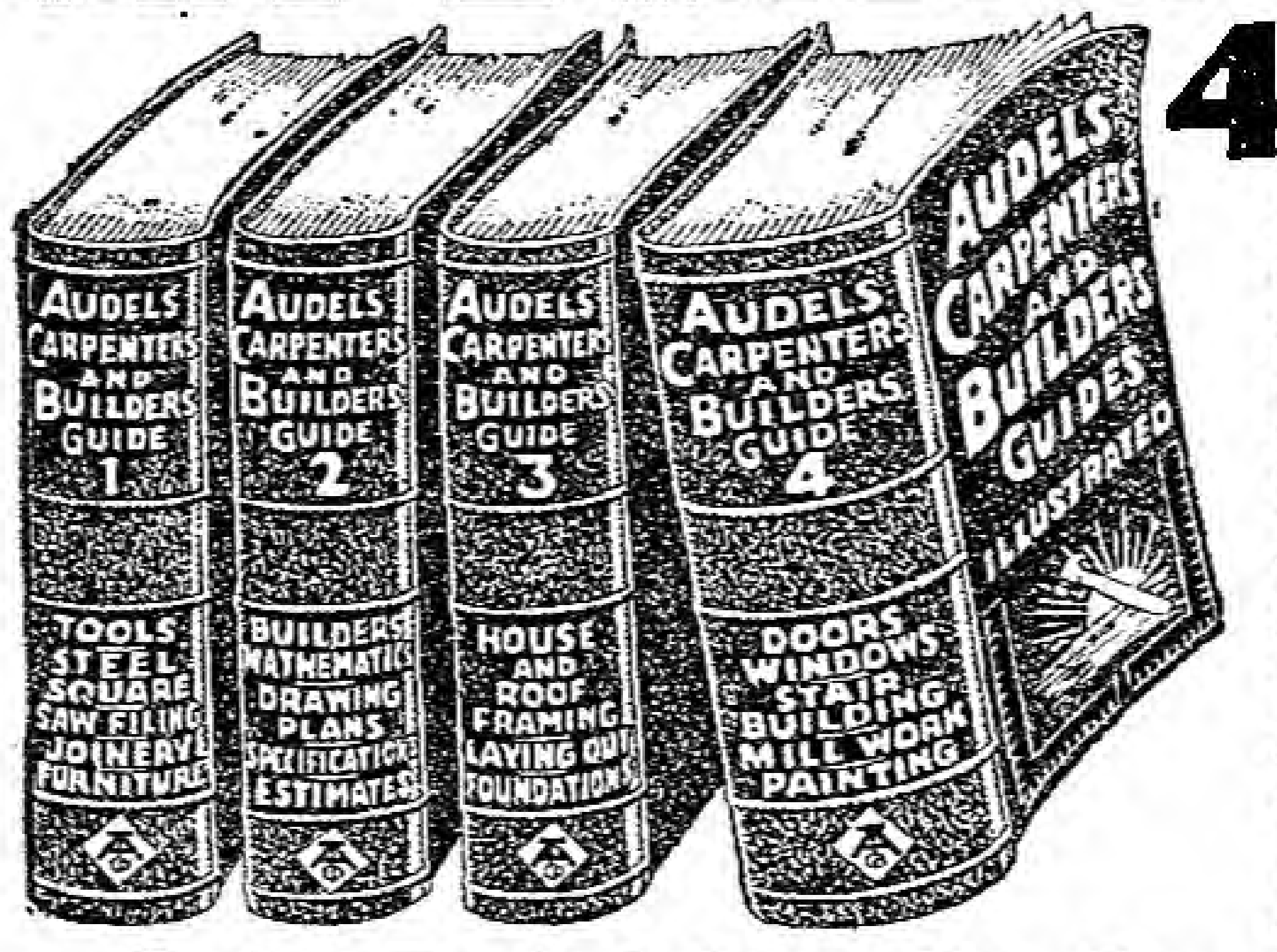
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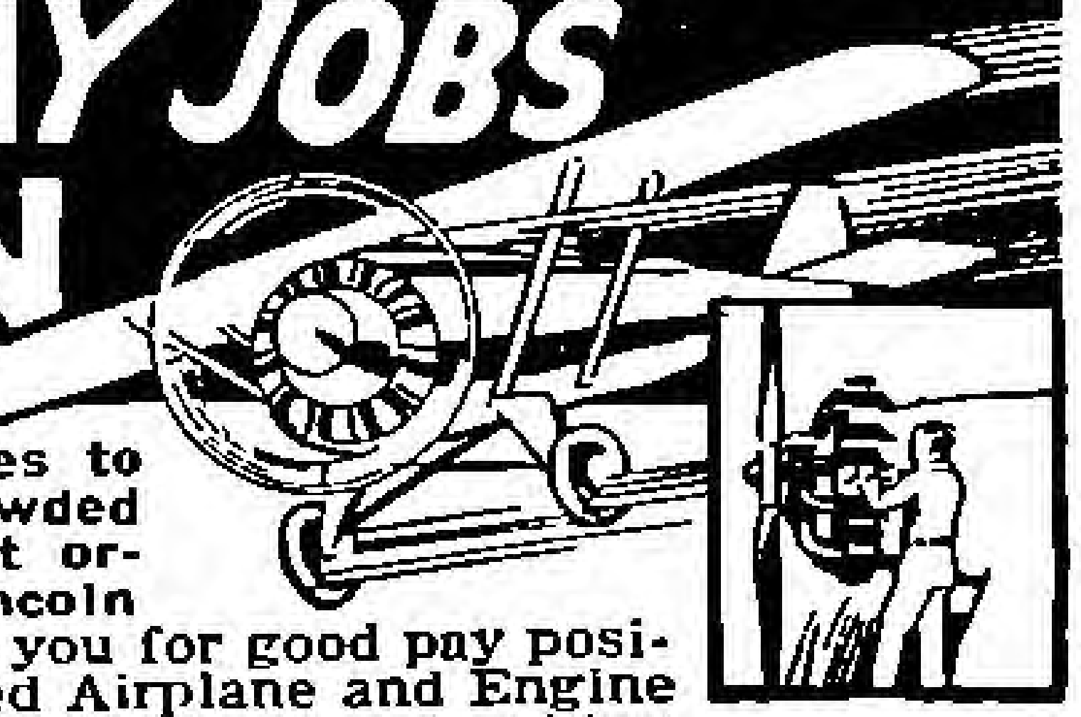

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Trapping Enemy Spies

[*Continued from page* 140]

quaint but practical bits of information. Those are charms of the crytographer's Black Art. Yet even with their aid, to break a long code message of hundreds, perhaps thousands of words and phrases arranged numerically and alphabetically, is a wearing task of days, weeks, perhaps even months. But, once that message is solved, every other message in the same code will be solved . . . if it is known to be a code message.

But such messages are not labeled "via spy-wireless." How guess about that dirty shirt; or about the string, with knots spaced to fit a ruler with twenty-six notches, one for each letter; or about the pencil "bought" openly on the street from a "peddler," its twenty-six bands bearing pin-pricks? Then there is the stencil, with holes at fixed intervals. Place it above the innocent-looking letter, and in the holes appear the key words cleverly interspersed in that letter by a writer with a duplicate of the stencil. And the book-code, in which words are written as strings of numbers; page, line and word of a book, perhaps a dictionary, previously agreed upon by the correspondents. How could any one know which book, of millions? Well, no one need know, to solve the message! William F. Friedman, the leading American cryptographer, has solved book-code messages, without knowing what book had been used! Largely by tables showing the frequency of use of words and letters, he broke up a Hindu plot to start a revolution in India.

And now that the colleges are open again, many night students of a New England institution pass the dimly lighted windows of the chemistry laboratory,

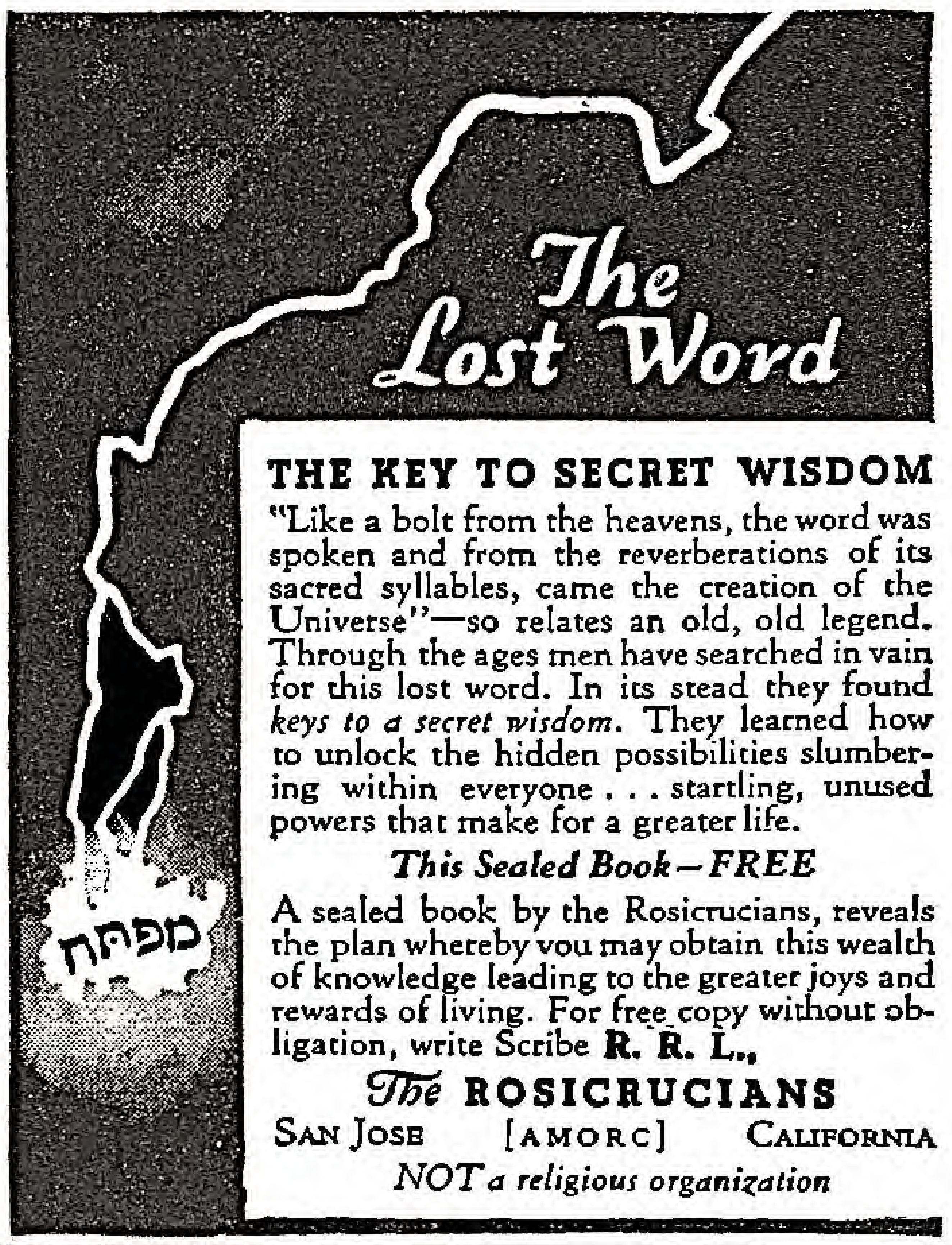
"Prof's working late," they remark. "Making new stinks."

There would be bad odors indeed, if some of the Professor's secret alchemies were made public. So he keeps but one lamp burning. It silhouettes his figure, bending over a drawing-board. On the drawing-board is tacked a sheet of paper, but upon its fair white surface appears no mark. Slowly, across the paper the Professor draws a toothpick, around which is wrapped a spill of cotton, stained brown. It leaves a trail of rich sepia.

Suddenly, startlingly etched upon that brown background appear white letters, words. But, with a chill of horror, the Professor sees them begin to fade. Hastily he copies them, thrilled at their import. Somewhere in New York, is a woman spy, on a dangerous mission. So the Professor reports to Washington, whence Uncle Sam sends him not infrequently, a call for help when he has a secret ink message to solve.

Most such messages can be developed by the iodine treatment, either brush or vapor, which shows up the tiny paper fibres ever so slightly disarranged by the pen in writing. So some spies

[*Continued on page* 144]



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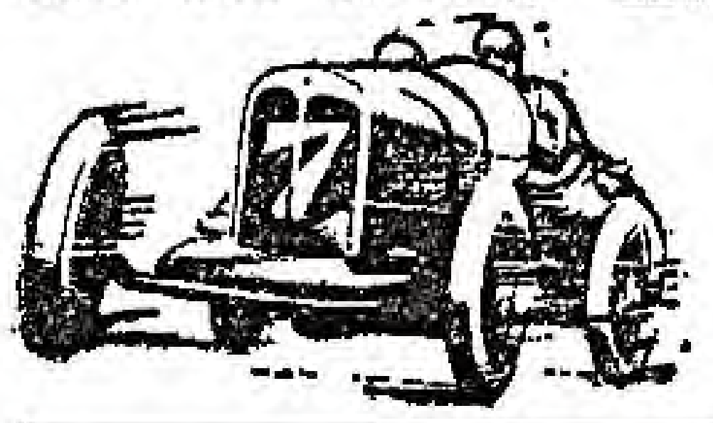

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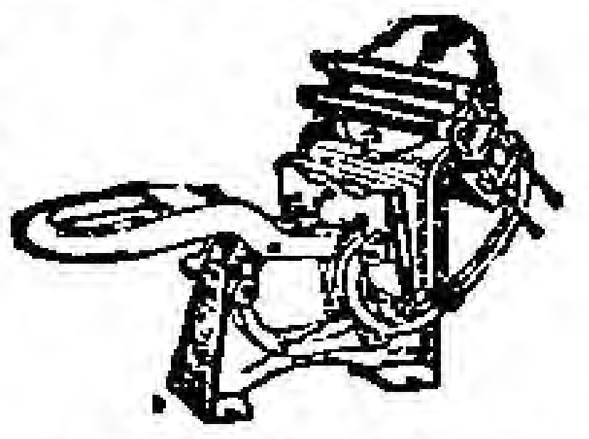

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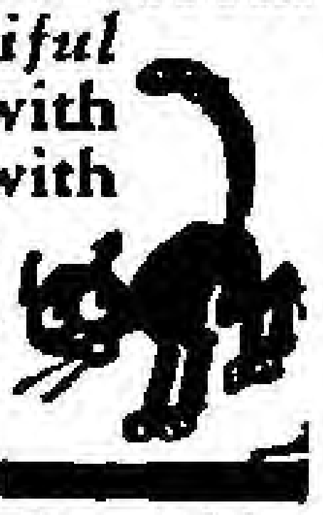

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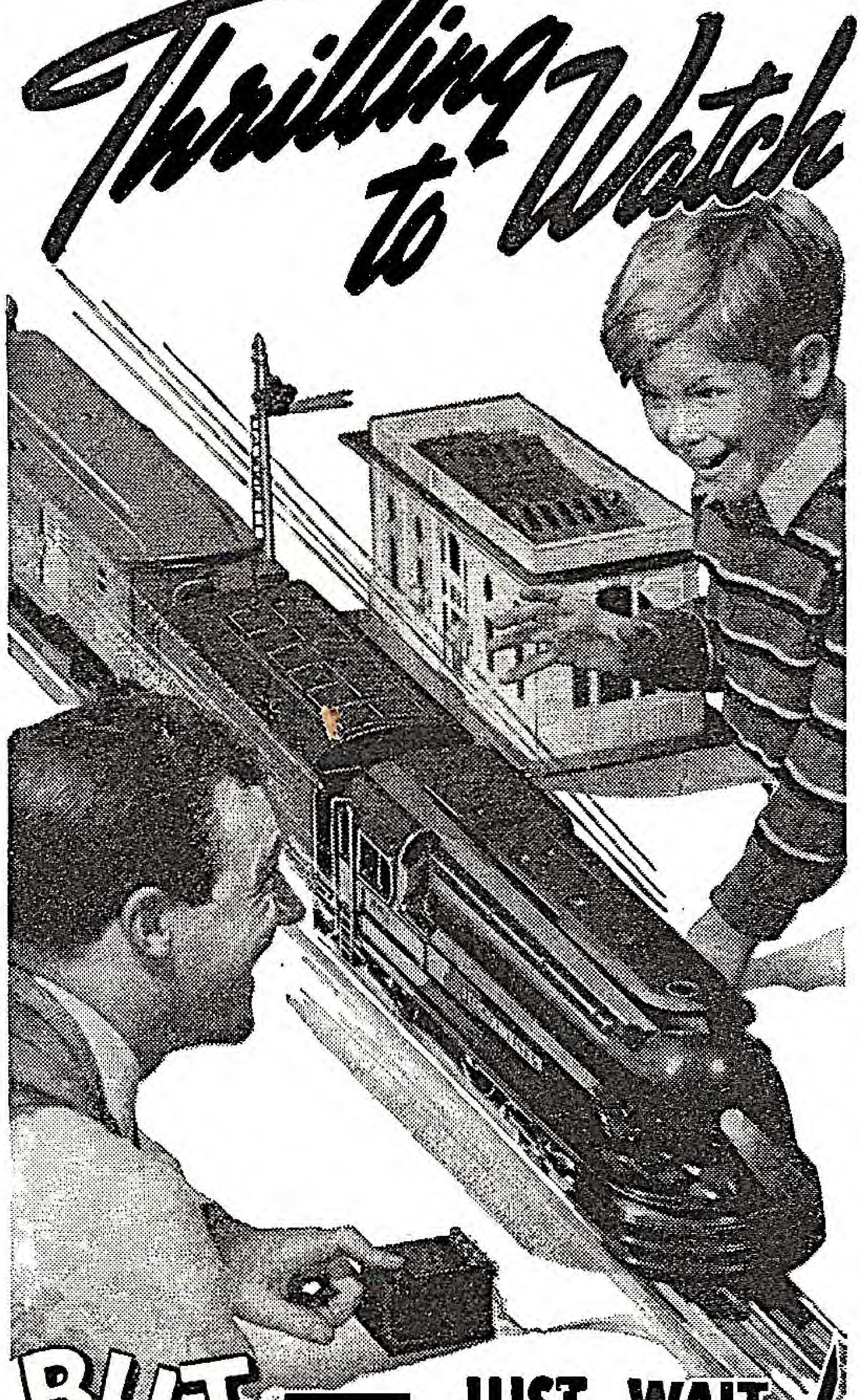

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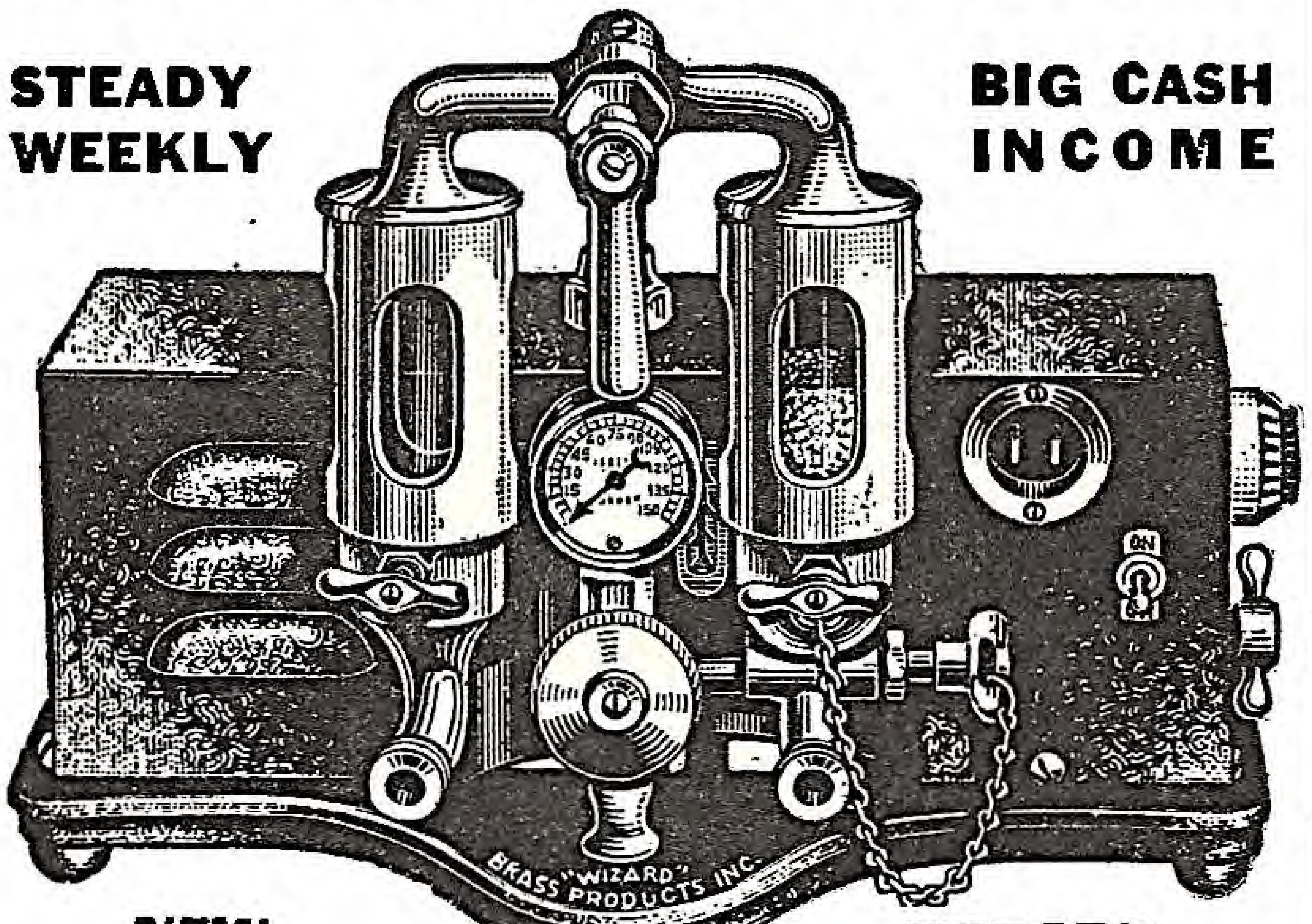

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Trapping Enemy Spies

[*Continued from page* 142]

use a ball-pointed pen—but that is a giveaway when they are caught. To destroy such damning evidence, one spy swallowed his pen and nearly killed himself! Spies usually write secret messages in their invisible ink, between the lines of a harmless letter written in ordinary ink. To prevent being caught possessing invisible ink, spies may soak a black sock with silver preparation, and when they want ink, soak it again in water and write with the solution. Or they may use ferrocyanide of potassium, cobalt, dilute sulphuric acid, copper oxide, acetic acid, solution of chloride of nickel.

If spies use such chemicals, to conceal thought, spy-hunters use other chemicals, to reveal that thought. Secret services have laboratories, compounding new secrets or solving the secrets of others. Mussolini's secret service, the Ovra, suspects travelers carrying aspirin, "a substance for making secret ink."

These World War censors are testing suspicious letters of American doughboys for secret inks. A special chemical laboratory was maintained especially for this one purpose.

An alert American postal clerk opened an undelivered dead letter. Eyes popping, with trembling fingers he withdrew diagrams and plans of the Panama Canal. Who could be sending them, to whom? Down in the Canal Zone, prison bars clanged behind a Brooklyn youth, a tall young man with dark, intelligent face, a Regular Army corporal, but a Reserve Lieutenant. Stationed near the Canal, he had access to secrets that foreign powers could use to destroy our water-link between Atlantic and Pacific. At a court-martial, the prosecution tried to prove that those secrets were reaching Communists. Col. E. A. Buchanan accused the corporal of corresponding with Reds under false names, and accepting money. He admitted Communist sympathies.

"Twenty years at hard labor!" the court decreed.

President Roosevelt ordered a new trial, and

[*Continued on page* 147]

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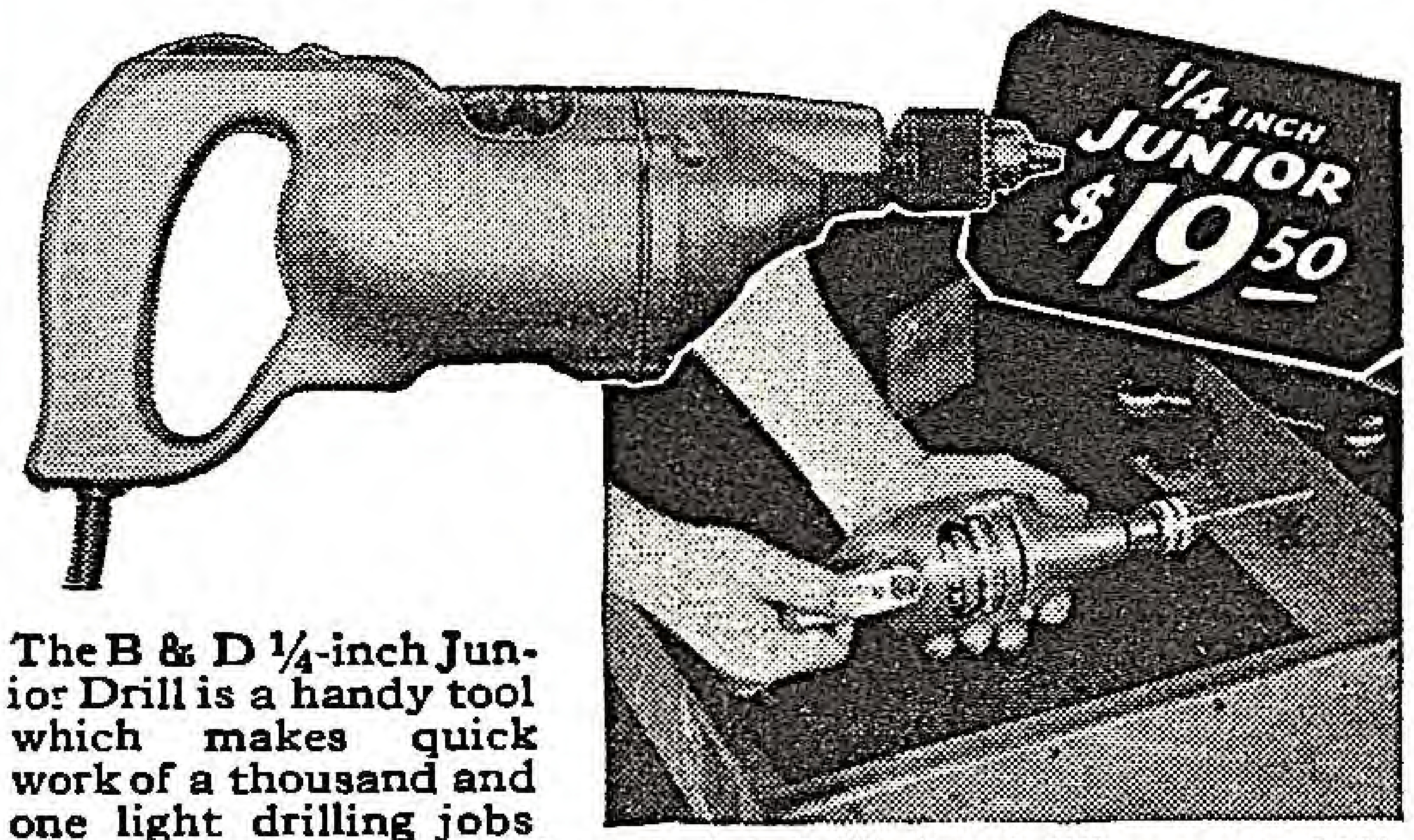

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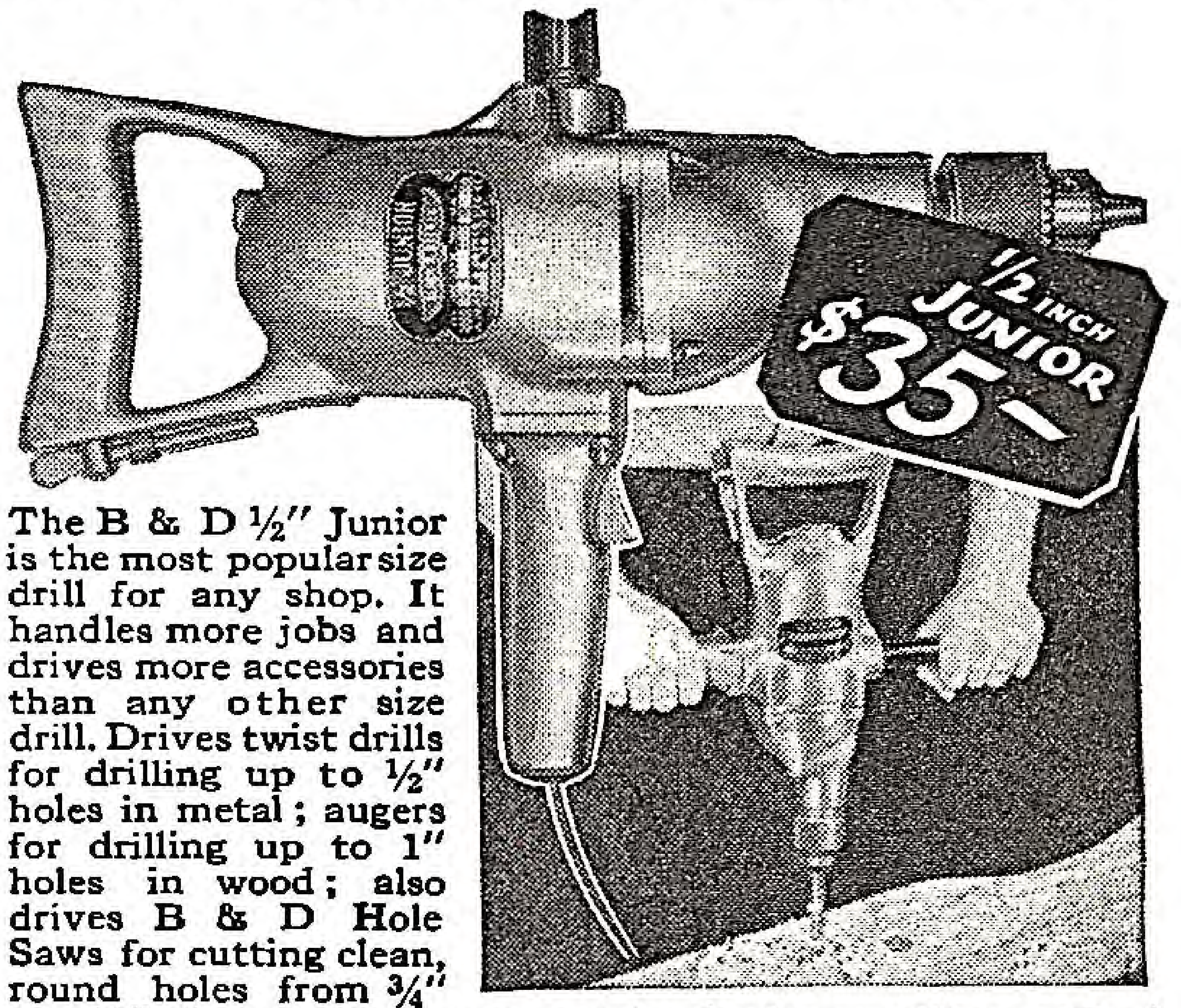

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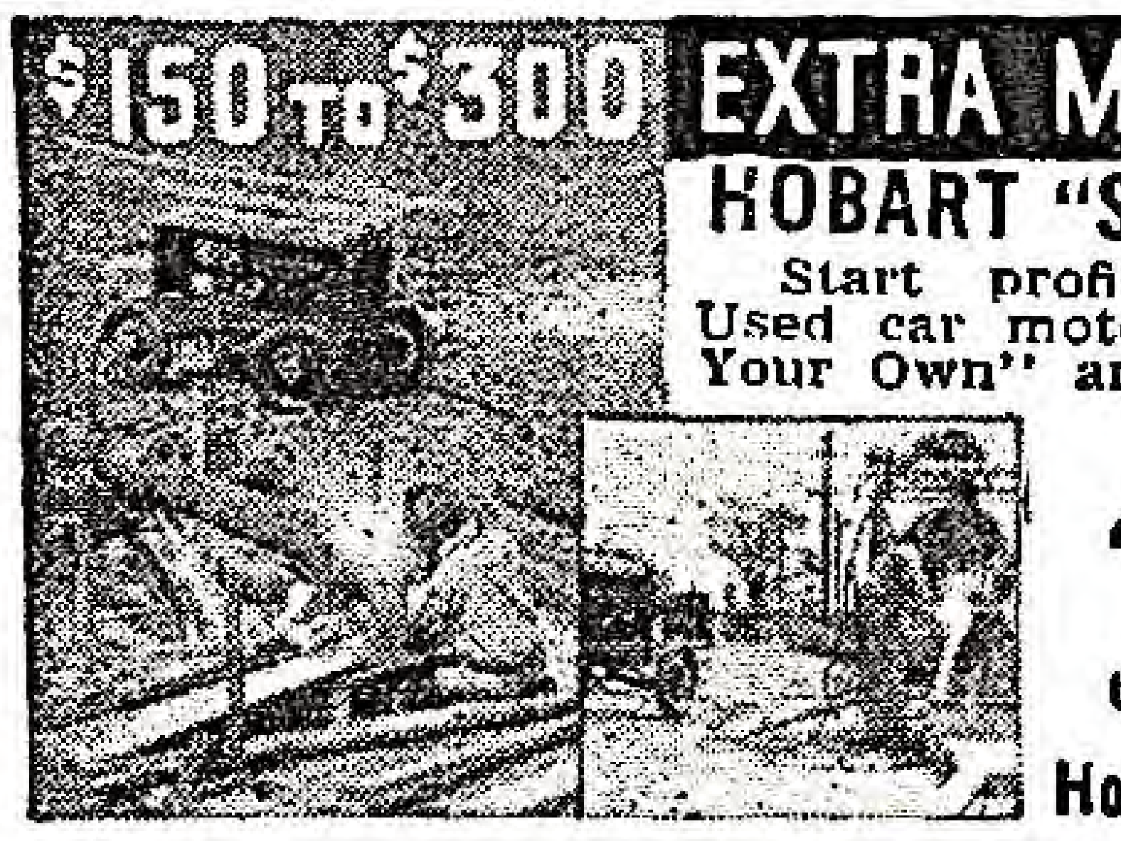

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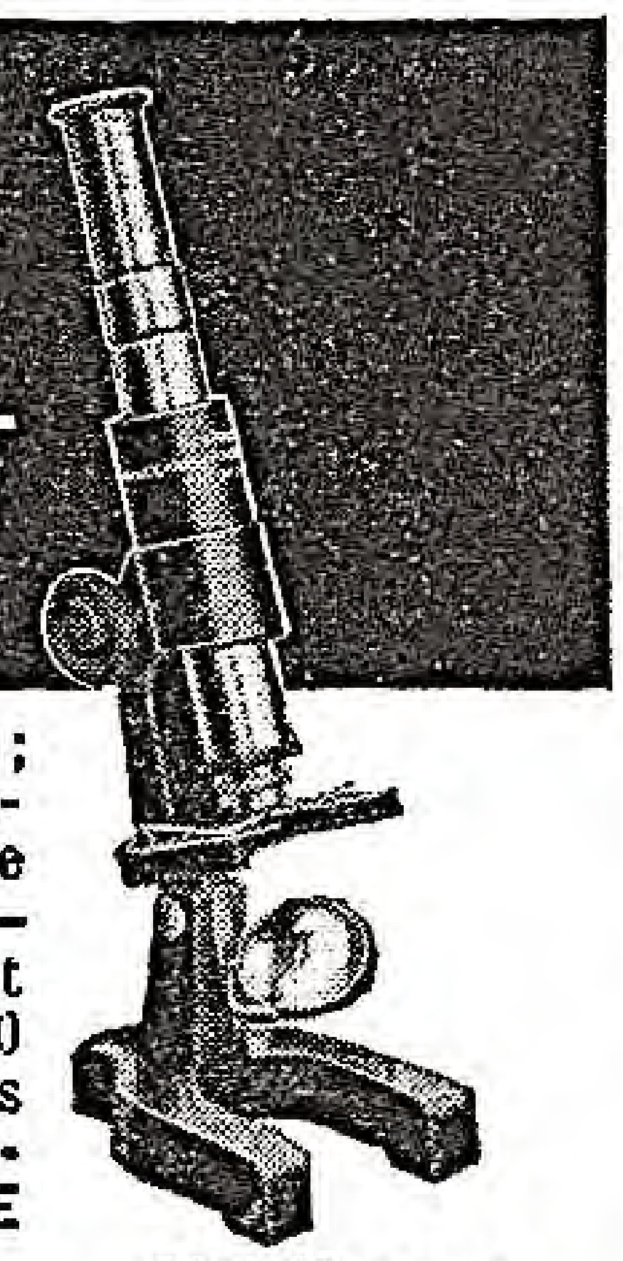

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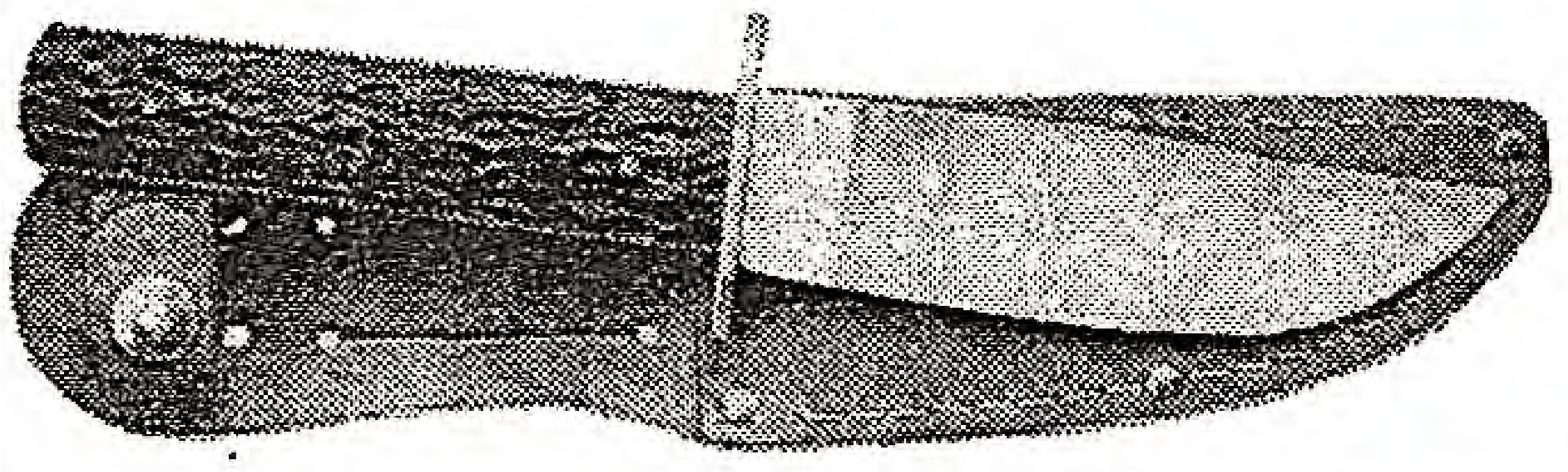

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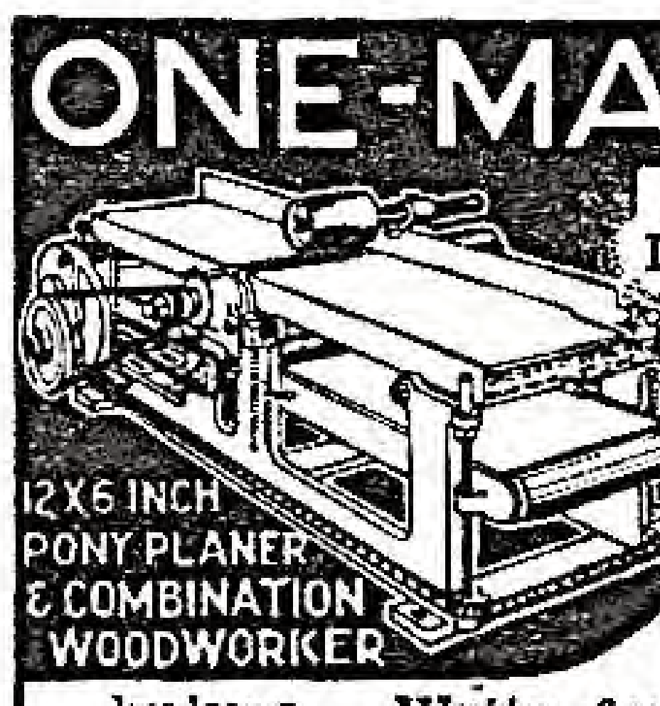

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Trapping Enemy Spies

[*Continued from page* 144]

the corporal was acquitted. Over a year ago he left the service, having proved two startling facts; The Army was letting its secrets lie around rather loose, perhaps because its regulations protecting them lacked teeth. Then the Navy too, was jarred by the case of Commander Matsuda, Japanese naval officer caught photographing our cruisers. Both services made anti-spy rules of which the latest, just before the Thompson and Farnsworth cases, forbade discussing or revealing to outsiders, especially foreigners, information about planning or producing of special equipment. Also, whoever gives away or sells "any writing, code book, signal book, sketch, photograph, blueprint, map, model, etc.," about such a project may get twenty years—in peace time. In war, he may be shot. Farnsworth was charged with violating this regulation.

Since the Navy began shadowing him, a year ago, it has closely guarded confidential papers, and one officer has been disciplined for relaxing vigilance. The Navy has also invoked the aid of civilian Reserve Officers to hunt spies about Pacific naval bases, while the Army covertly watches Hawaii's large Asiatic population. The last Congress passed a law forbidding photographing in 24 strategic areas; military, naval, aviation.

To protect the unequaled products of American "air-brains," strict guard is kept at fields like that at Dayton, O. Nevertheless, a German was caught recently trying to smuggle aboard an ocean liner drawings of a flexible aircraft machine-gun.

He got off, for our weak laws poorly protect the products of our own inventive brains, against thieving foreign spies. No wonder part of Japan's $12,000,000 secret service budget is spent to buy our Navy's secrets; yet Japan morbidly fears spies within her gates, and arrests American tourists for snapshotting scenery. The Japanese are not the only ones. Two French girls were caught recently tempting American officers ashore at Marseilles, to reveal inner workings of the cruiser *Pittsburgh.* The celebrated Soviet *Ogpu* recruited here Switz, Jacobson and other Americans for international rings spying upon France and Finland.

These cosmopolitan groups of men and women in Soviet pay included other Americans and Canadians, Frenchmen, Russians, bribed chemists, technicians, code experts in French government laboratories. Most of the 32 were convicted in March, 1935. The Switzes won release by confessing, that the spy-wireless was their rooms in the American Student Union in Paris, whereby the gang communicated with one another and with Moscow. Arvid Jacobson of Detroit, Soviet spy in Finland, was released only recently. A Soviet spy ring of a hundred was recently rooted out of Rumania.

[*Continued on page* 149]

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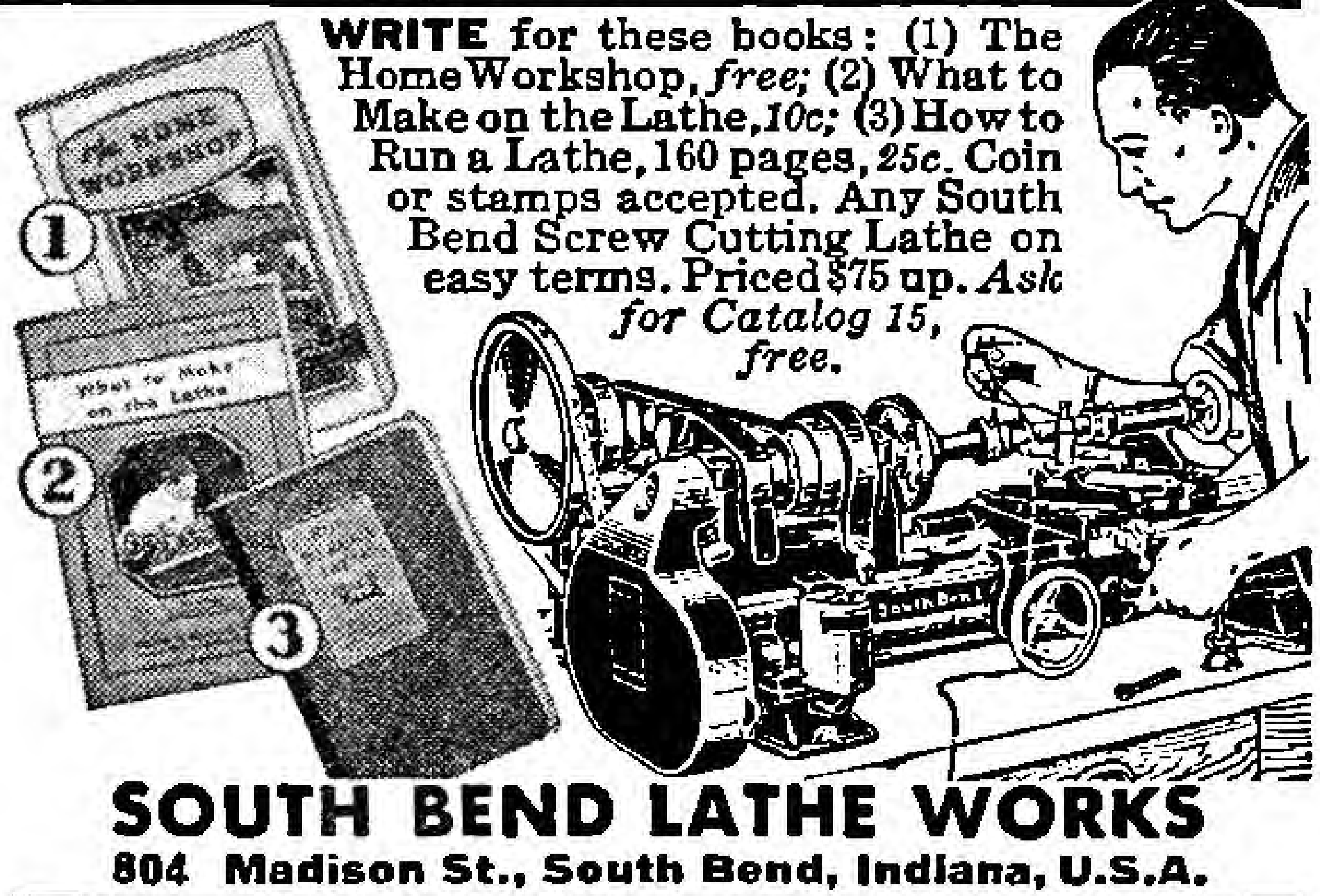
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Before me, a Notary Public in and for the State and county aforesaid, personally appeared W. M. Cotton, who, having been duly sworn acording to law, deposes and says that he is the Business Manager of the MODERN MECHANIX HOBBIES & INVENTIONS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, W. H. Fawcett, Breezy Point, Minn.; Editor, Tom Mahoney, Greenwich, Conn.; Managing Editor, W. J. Kostka, Greenwich, Conn.; Business Manager, W. M. Cotton, Greenwich, Conn.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Modern Mechanix Publishing Co.; Fawcett Pub., Inc., Greenwich, Conn.; W. H. Fawcett, Breezy Point, Minn.; Frances Fawcett, Breezy Point, Minn.; Roger Fawcett, New York City; W. H. Fawcett, Jr., Chicago, Ill.; Gordon Fawcett, Hollywood, Calif.; R. K. Fawcett, Greenwich, Conn.; Marion Fawcett Bagg, Tulsa, Okla.; Roscoe Fawcett Estate, Minneapolis, Minn.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is—(This information is required from daily publications only.)

W. M. COTTON,
Business Manager.

Sworn to and subscribed before me this 29th day of September, 1936.

[SEAL] HELEN M. LANO.

(My commission expires February 1, 1941.)

Trapping Enemy Spies

[*Continued from page* 147]

The largest international spy case of the summer was the great Trotsky conspiracy to kill Stalin, seize power in Russia, and lead a Red world revolution. It ended bloodily in August with the execution of 16 men including high Soviet officials. The plotters communicated by a code giving page and line in the Arabian Nights.

The Gestapo should have done better if, as was charged, it aided the plotters. Hitler's secret police looms today as among the world's most formidable secret services. Its ruthlessness appeared recently in the sensational case of two German noblewomen, the Baroness Von Berg and Frau Von Natzmer who for $100 a month sold stolen German military secrets to a dashing Polish cavalry captain, Yurek Sosnowski. At midnight of February 17, 1935, the beautiful women's heads were chopped off; for 14 months, Sosnowski was kept in a dark cell, his food lowered through a trapdoor. Released last May, wrecked in health, he thinks only of the face of the woman he loved, the Baroness Von Berg, and of her despairing cry: "Yurek, help me!"

Nazi Germany sends into other countries, especially France, spies to steal their secrets. One of them, La Belle Sophie Drotz, ran a cabaret frequented by soldiers and workmen on France's new underground frontier fortification. Other German women spies in France the past year have have been Mlle. De Versi, a snake dancer who lured Foreign Legionnaires, and Lillian Oswald, whose prey were young naval officers on new war vessels. And Germany claimed an American girl, Isobel Lillian Steele, was a Soviet spy, and held her four months. A movie depicting her adventures appeared recently.

Many women have flickered across the screen of international intrigue these last two years; Marie-Louise who tempted the Highlander Captain Baille-Stewart to betray British secrets; Frau Littke, Polish dancer who spied for two countries and ensnared Regent Horthy's bodyguard in Budapest; the mysterious Mlle. D. who stole Mussolini's secret codebook; Cecilia Tokuda, Japanese woman spy and flyer, and many others.

What has been their reward? If successful, usually a pittance; if unsuccessful, prison or a firing-squad, such as ended the career of Mata Hari, the dancer. Their employers usually disown spies. Peace time spying has no public reward. Some war time spies have received decorations, but few. France gave the Legion of Honor to Mme. Georges Herlieg, who ran a wireless behind the German lines; to Marthe Richard and to Marie-Leonie Vanhoutte, whose gallant companion, Louise de Bettignies, received its white cross after her death in a German prison. A monument has been erected to her, also to Lody, the brave German spy shot in the Tower of London.

[*Continued on page* 150]

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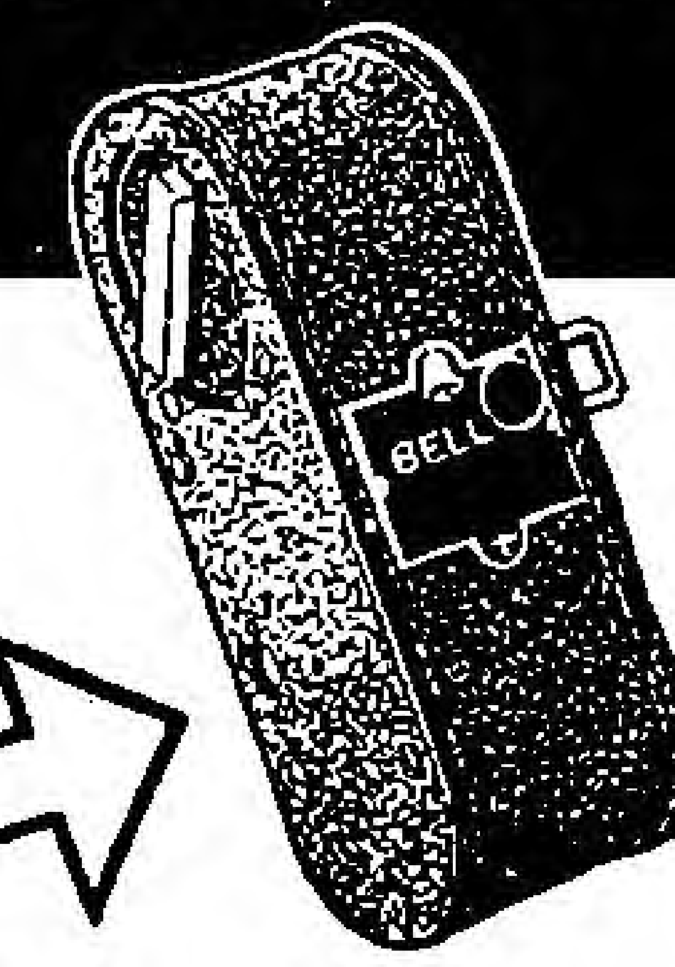

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INVENTORS

SEE

Pages 12 and 13

Trapping Enemy Spies

[*Continued from page* 149]

We have our monument to Nathan Hale in New York, but generally, we do not reward our secret agents publicly. An American I know accomplished daring feats, including going to Berlin in disguise, was recommended for the Distinguished Service Medal, but never got it. Another American spy got a British decoration but not an American. Yet their superiors, intelligence officers, sometimes received the D. S. M. So it goes in that perverse game of secret service.

Our small Military Intelligence budget permits "employing agents" but these and the Navy's few operatives spy not on foreign powers, but on the spies foreign powers send to our peaceful shores. For they do send them. Europe alone is spending this year some $50,000,000 on secret service. Every power is trying to find some means of communication that is absolutely secret; perhaps infra-red rays, perhaps a really inviolable, practical enciphering machine. Experts say one may be invented any day—and then will begin a new and even more startling era of spying, intrigue, and war.

Workable Ideas Win Prizes

[*Continued from page* 66]

by a hinged cover. The device would appeal to housewives in homes where floor sockets are not convenient to the table.

Prizes of $2 were awarded to Mrs. W. F. Hinckley, Waterbury, Conn., who suggested an asbestos rim to protect pie crusts while baking; to Ottis Pfrom, of N. Y. City, for his idea of a household scissors sharpener; and to Charles Carney, Pierson, Iowa, for his idea of a camera that would turn the film roll automatically after a picture was snapped.

Prizes of $1 were awarded to—Cleo Bennethum, Maxwell, Iowa; W. L. Motheral, McKenzie, Tenn.; Bruce C. Kirkbride, San Mateo, Calif., and Herbert Puckett, Circleville, Ohio.

Here are the contest rules:

1. In 100 words or less explain your idea for a needed invention. 2. This contest is open to everyone except employees of Modern Mechanix Publishing Co. 3. You don't have to buy a copy of the magazine or be a subscriber to enter. 4. Write your name and address plainly on your entry. No entries will be returned. 5. The editors of this magazine will be the judges. All decisions will be final. 6. Mail your entry to Inventions Contest Editor, Modern Mechanix Publishing Co., Greenwich, Conn. The contest closes December 1.

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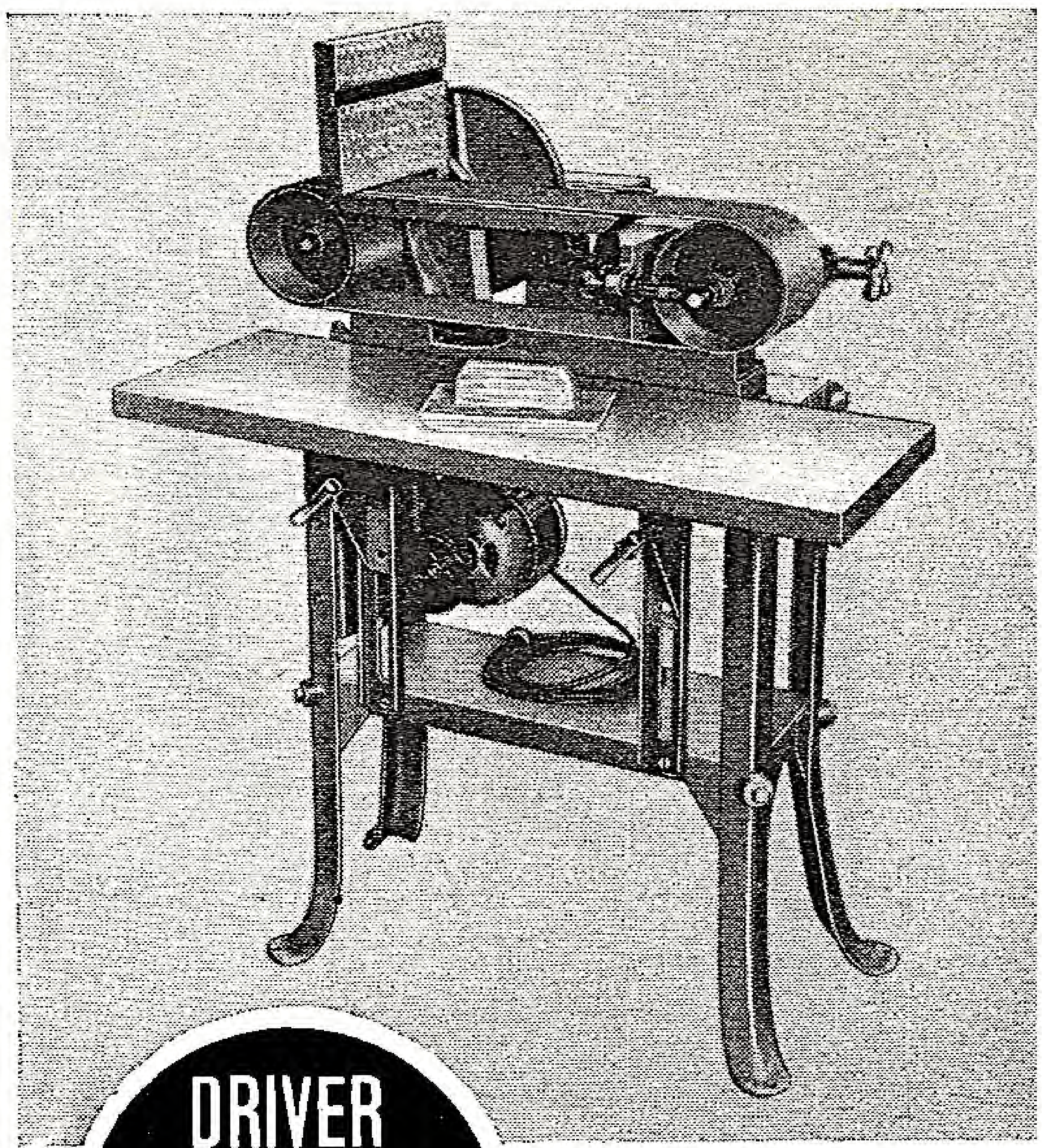

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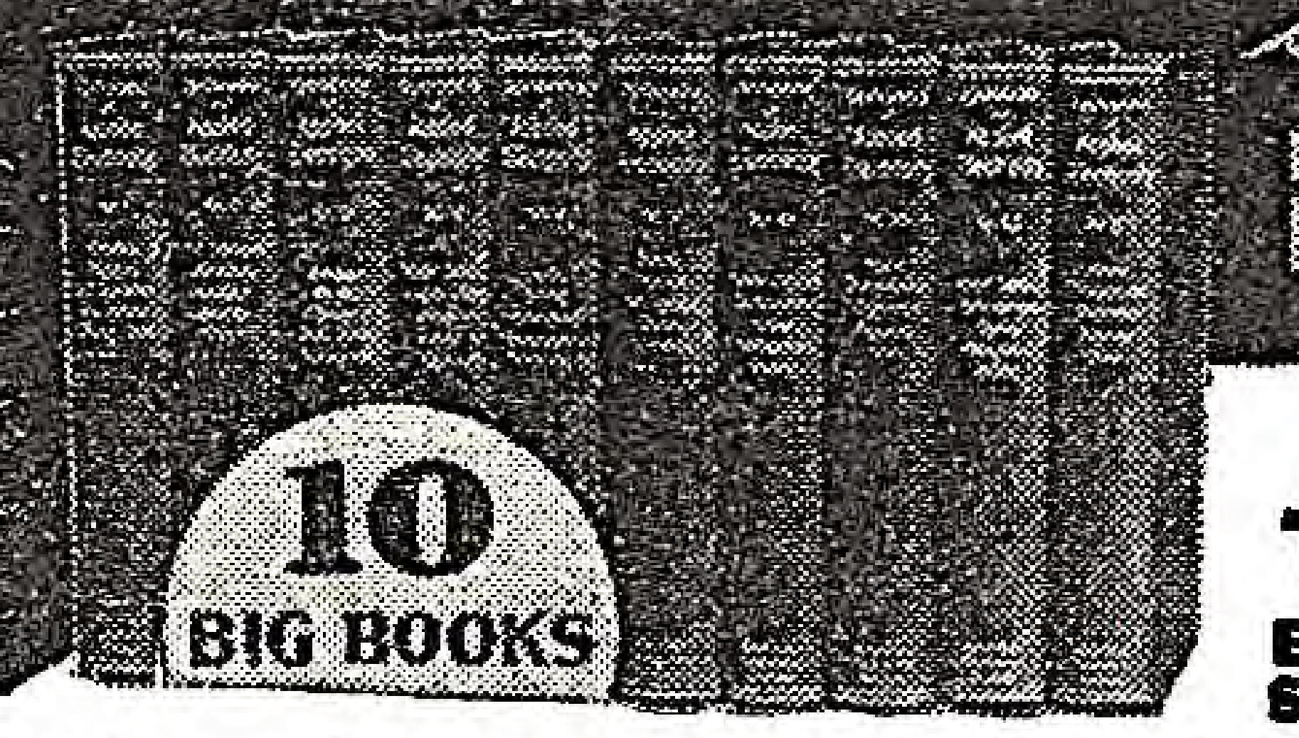

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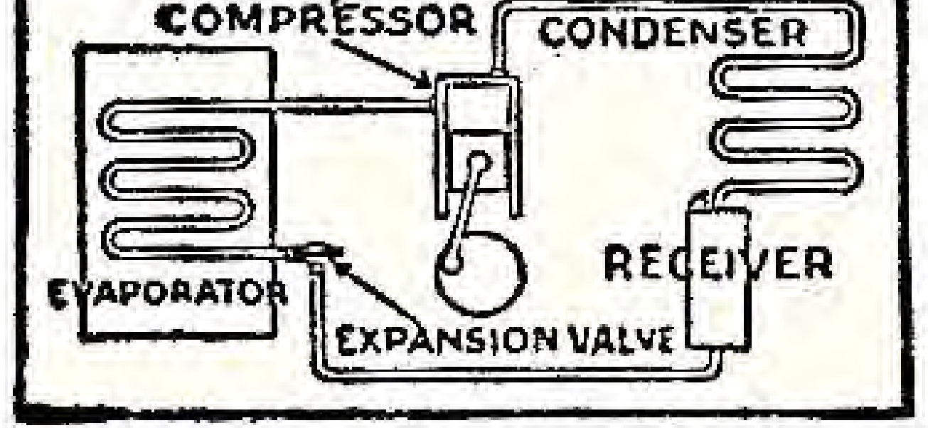

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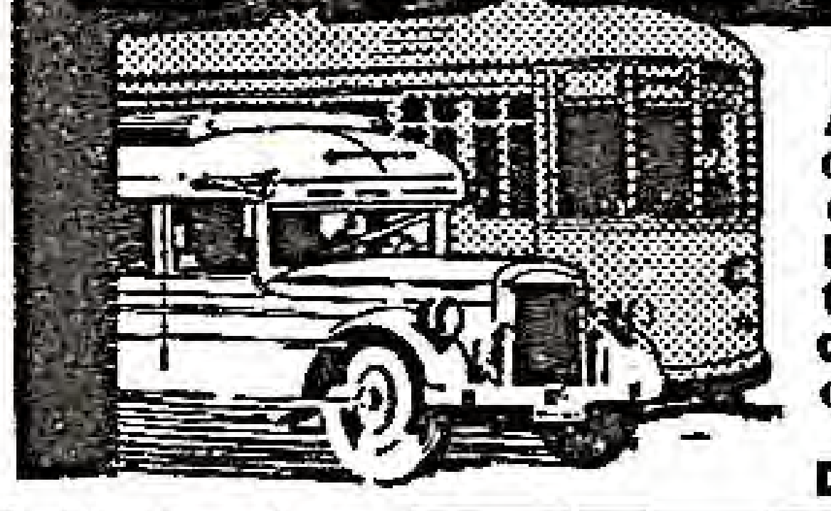

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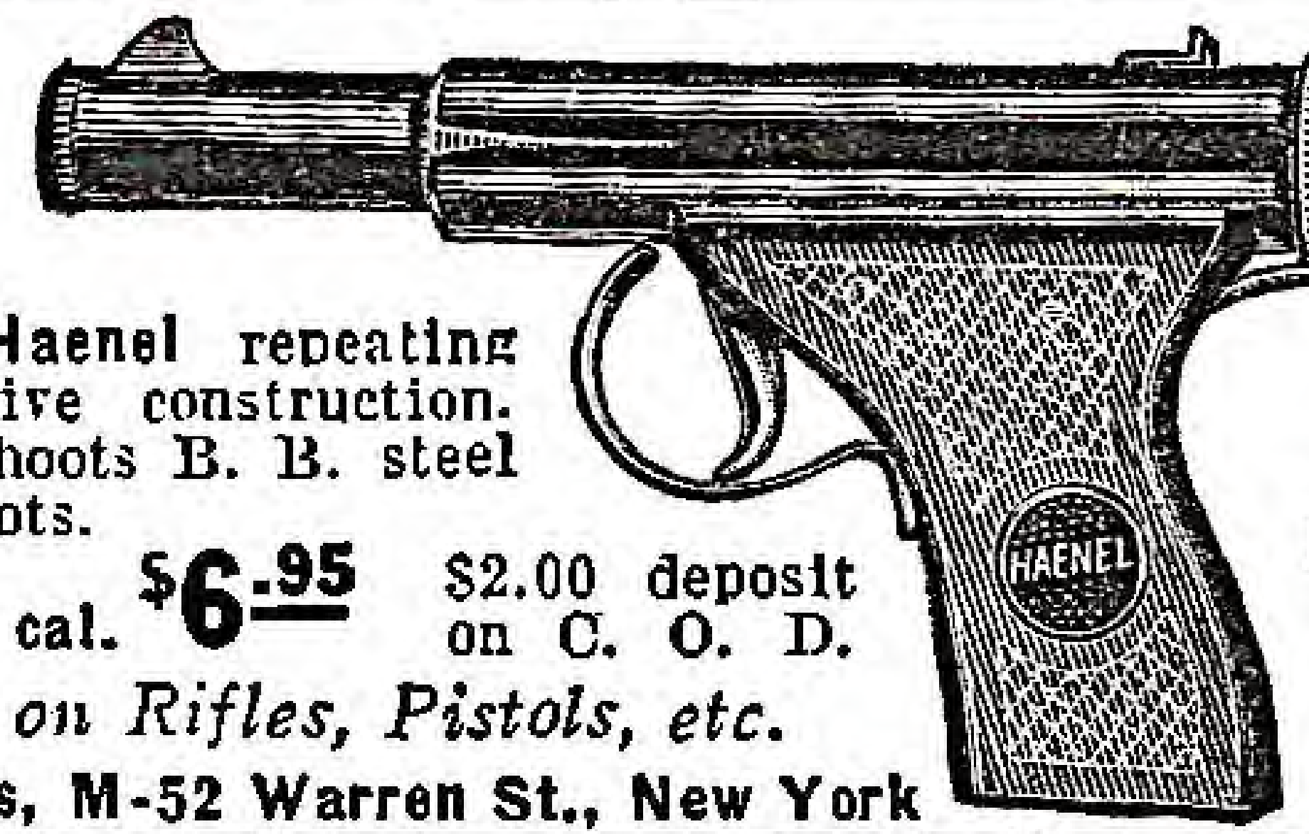

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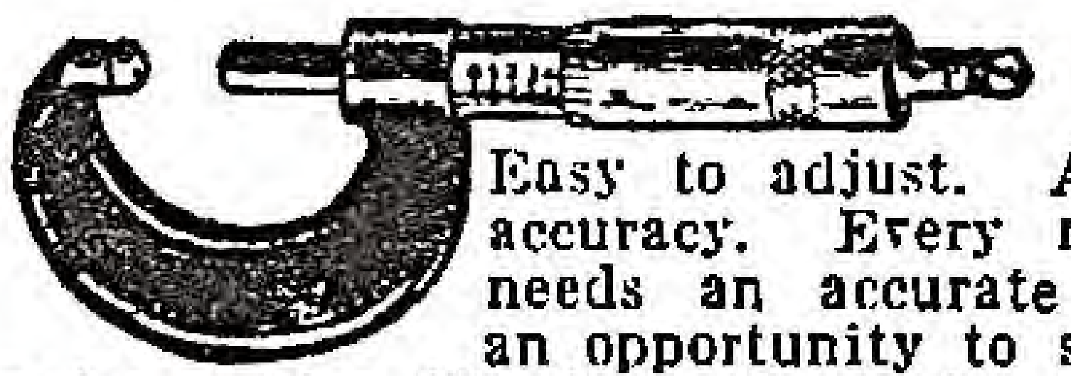

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Casting In Aluminum And Bronze

[*Continued from page* 122]

grees F. and lead at 620 degrees F. However, when combined in equal parts as for soft solder, the melting point of the alloy is only 365 degrees F.

Many will stoutly maintain that brass is the most common alloy. Perhaps it is, at least in application and usefulness. Common brass is made by melting copper 85.0, zinc 5.0 and tin 10.0. Here are some other combinations and their percentages:

Kind of metal	Copper, per cent	Tin per cent	Zinc per cent	Other metals per cent
Aluminum bronze	88. to 95.			5. to 12. aluminum
Phosphor bronze	98.75	1.2		0.05 phosphorous
Aluminum brass			30.0	70.0 aluminum
Tough brass	55.0	0.5	44.5	
Yellow brass	66.66		33.33	
White brass	10.0	10.0	80.0	
Red brass	82.0		18.0	
Church Bell metal	78.0	22.0		
Bronze for medals.	93.0	7.0		
Gun metal	91.0	9.0		
Coinage bronze	95.0	4.0	1.0	
Pinchbeck (imit. jewelry)	90.0-85.0		15.0-10.0	
Pewter	10.0	90.0		
Inferior pewter		75.0		25.0 lead
Babbitt (one of many)	3.7	88.9		7.4 antimony
Type metal		20.0		20.0 antimony 60.0 lead
Stereotype metal	2.0	10.0		70.0 lead 18.0 antimony

The range of metal alloys given in the above table should enable one to work out just about whatever he wants in the way of special metal for casting or turning. Pewter is so easily made that coupled with its non-tarnishing characteristic, and ever voguish appeal, should be popular for turnings especially. For casting of medals and other small articles however, aluminum bronze is hard to beat.

Here is another table—this one giving the melting points of a number of metals and alloys:

Metal	Degrees F.	Metal	Degrees F.
Tin	512	Nickel	2646
Lead	620	Cast steel	2800
Zinc	755	Solder	
Aluminum	1300	2 Tin, 1 Lead	365
Silver	1760	1 Tin, 1 Lead	401
Gold	1947	Aluminum bronze	1700
Copper	1981	Brass	1800
Malleable iron	2100	Bronze	1900
Gray iron	2192	Phosphor Bronze	2000

While not as accurate as the cone method for determining degrees of heat (no thermometer can withstand high temperatures) the color method is worth knowing—and remembering. Here is the range of gradations of color of heated metal as experts know them:

Observed Color	Degrees F.	Observed Color	Degrees F.
First red visible in the dark	878	Orange	1650
Dark red	1000	Light orange	1725
Dark cherry red	1175	Yellow	1850
Cherry red	1375	Light yellow	1975
Light cherry red	1550	White	2100

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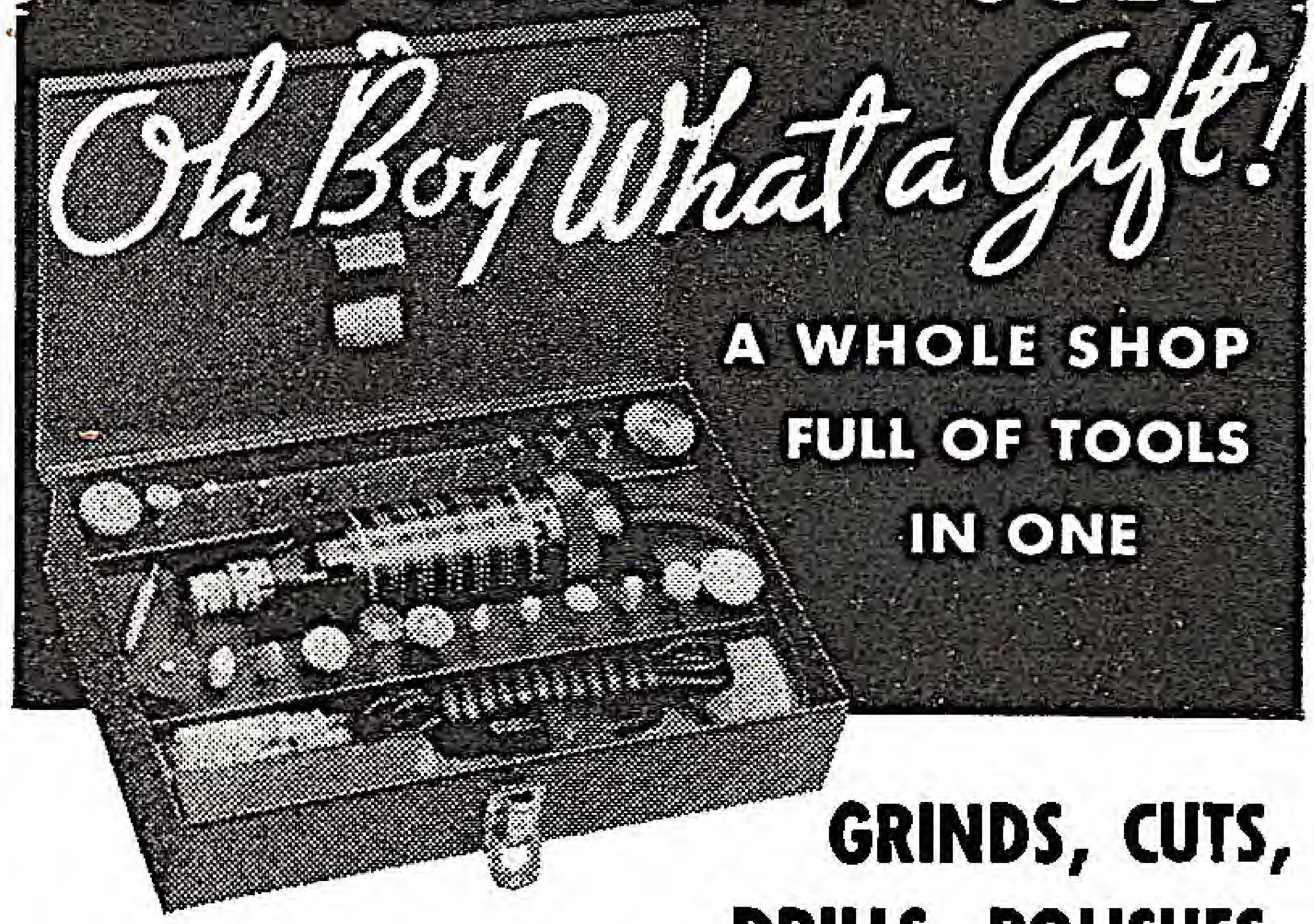

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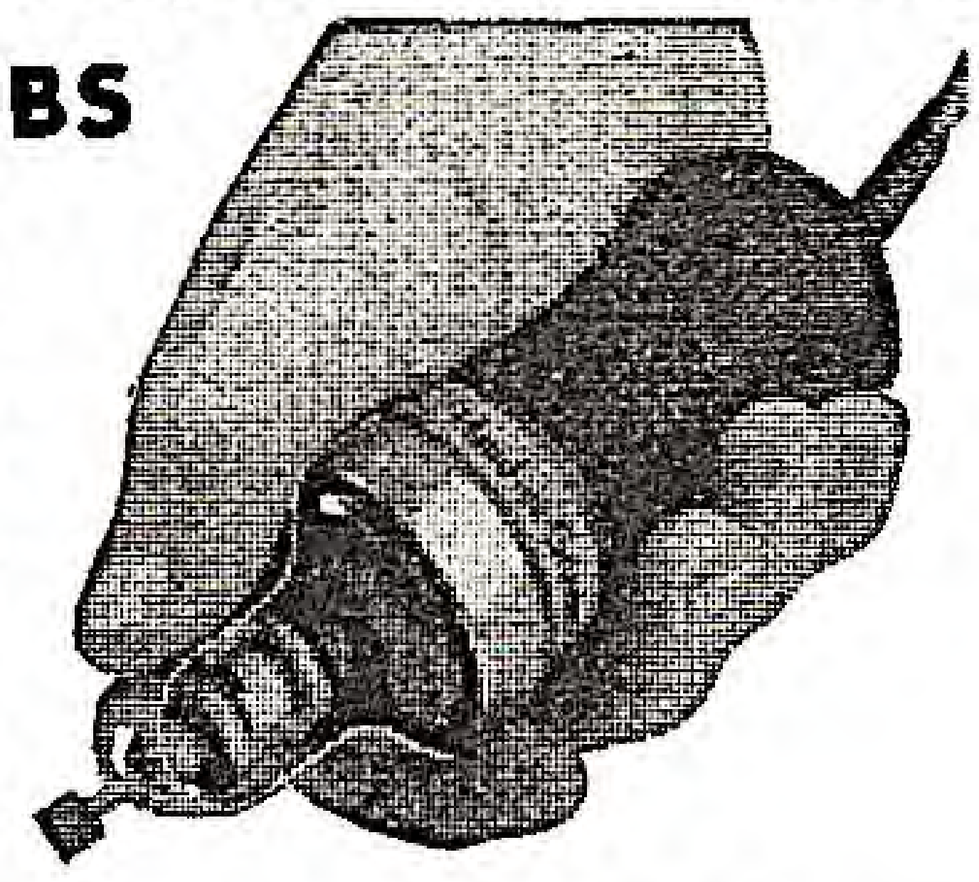

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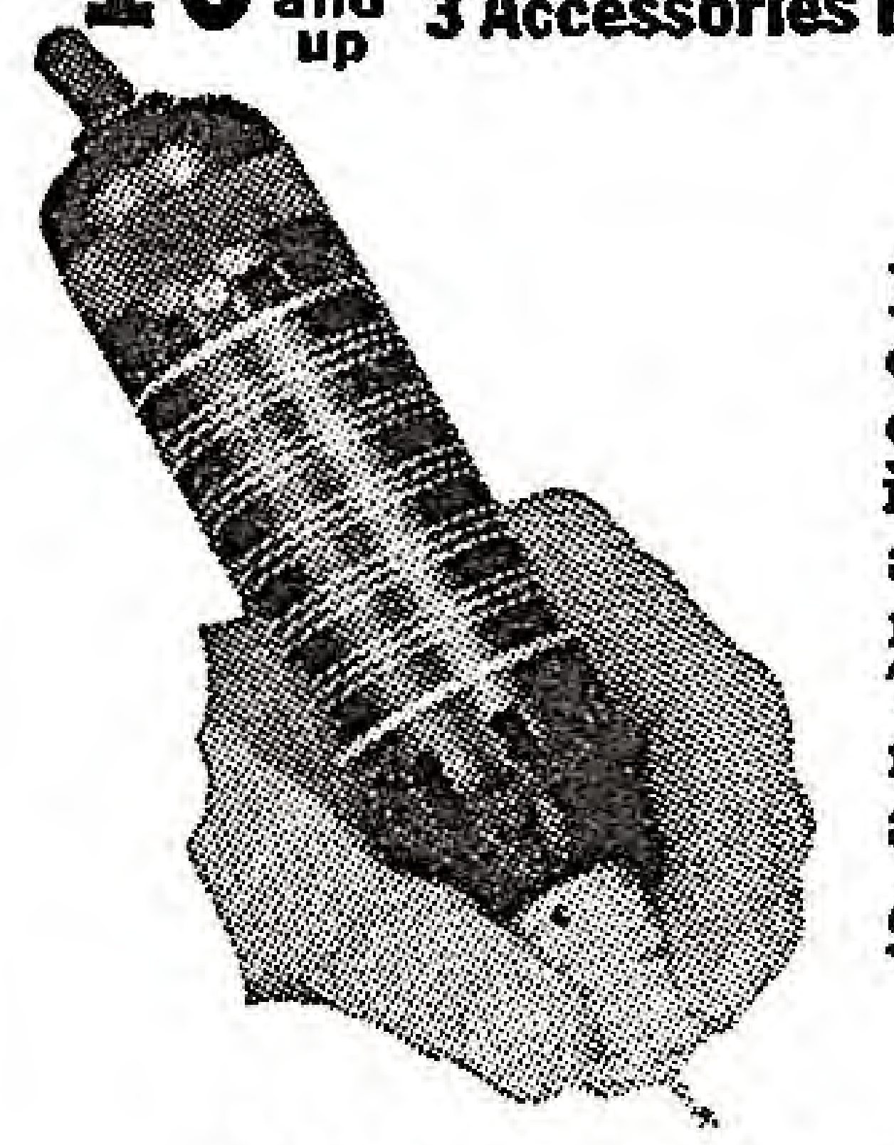

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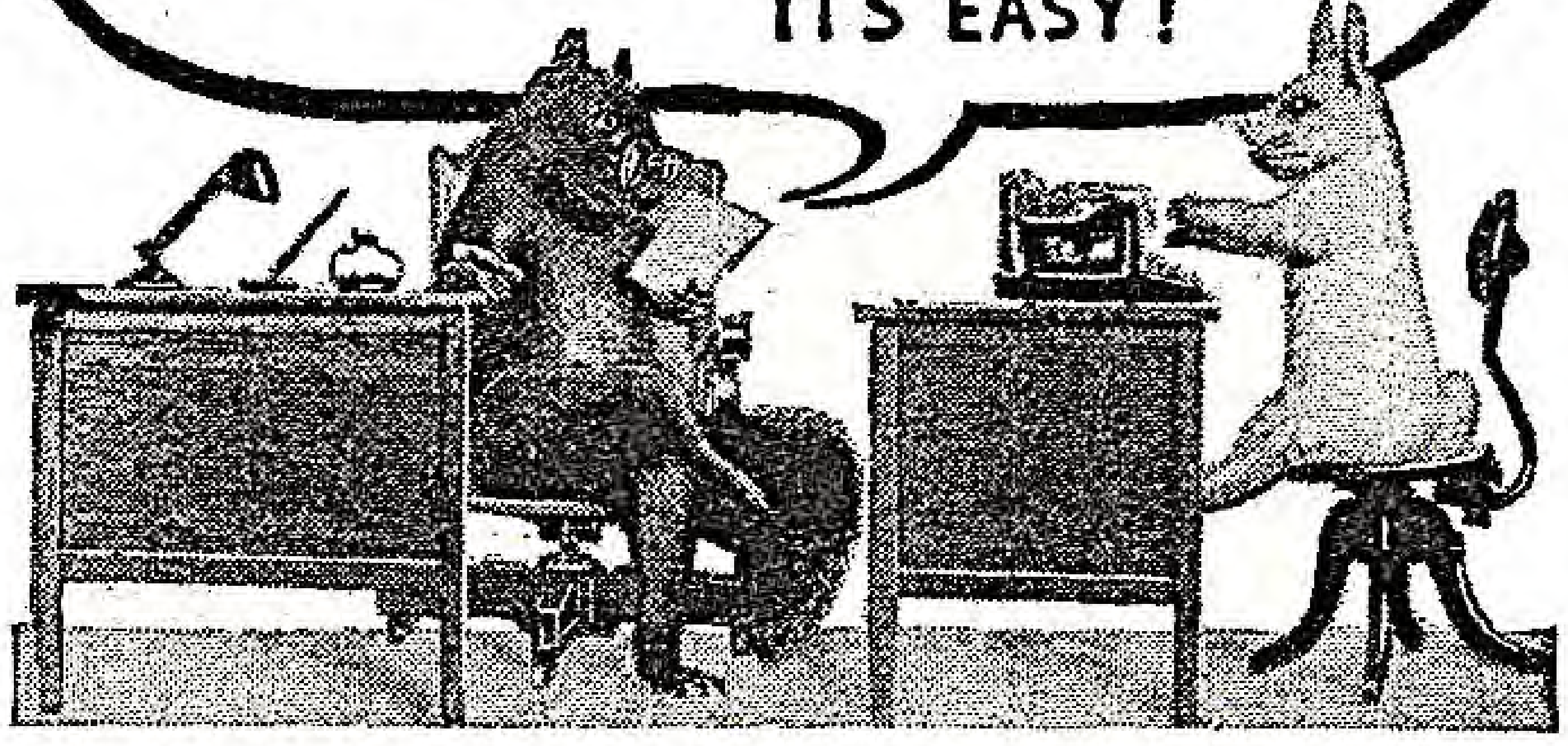

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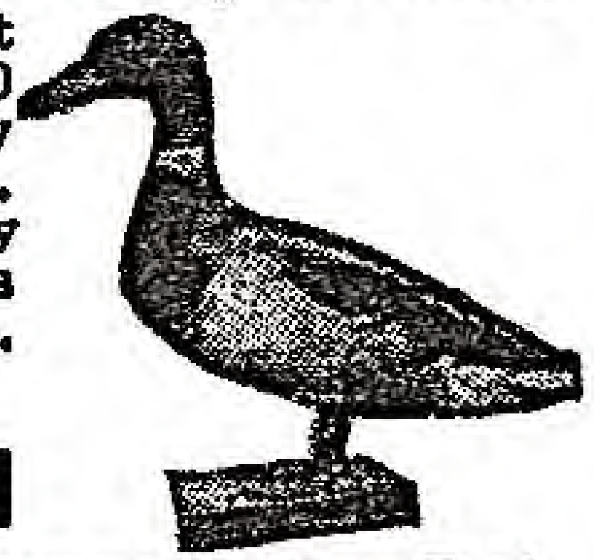

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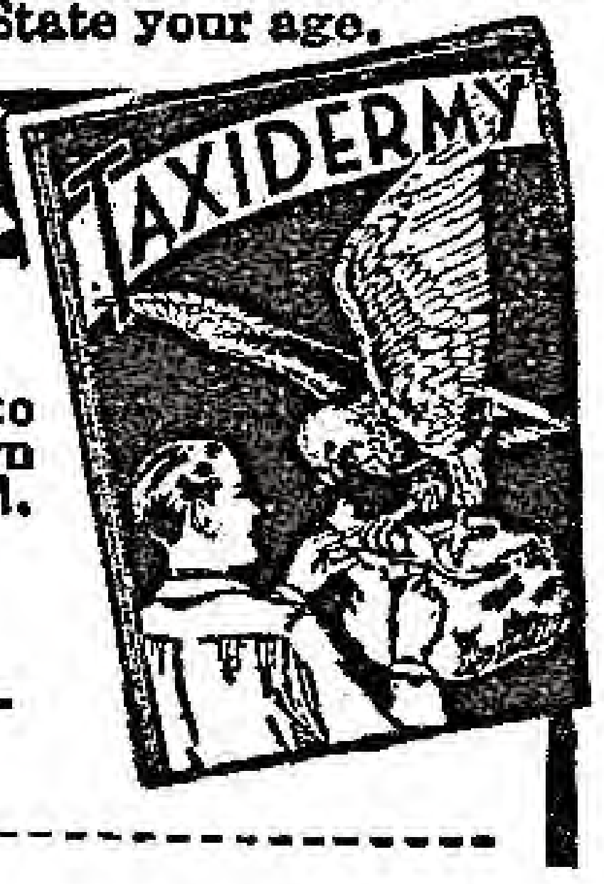

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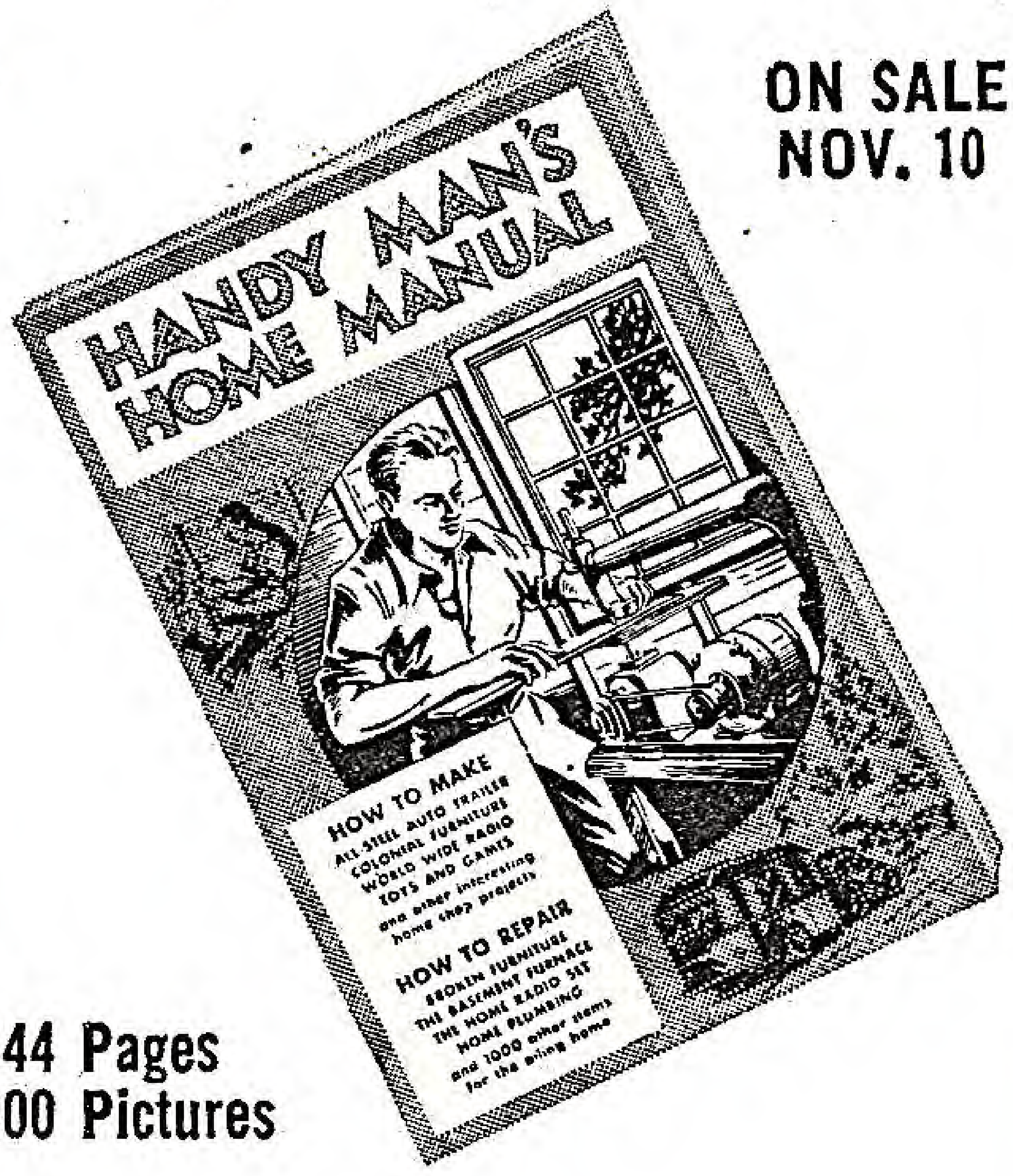

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Raising the German Fleet

[*Continued from page* 61]

under tremendous pressure. Either the bow or the stern would be brought up first, then more air would be pumped into other parts of the vessel, until it righted itself and floated.

After feverish months of toiling, Cox and his band of salvagers one day in June, 1927, watched the great battlecruiser *Moltke* lurch to the surface just eight years after the swirling currents of Scapa Flow had closed over it. In November, 1928, the 25,000-ton *Seydlitz* was raised, followed by the battleship *Kaiser* of 24,500 tons in March, 1929, the cruiser *Bremse* in November, 1929, the *Hindenburg* of 28,000 tons in July, 1930, the 20,000-ton battlecruiser *Von der Tann* in December, 1930, and the 25,400-ton battleship *Prinz Regent Luitpold* in July, 1931.

Of those seven ships the toughest proposition of all was the 28,000-ton *Hindenburg*, larger than any vessel ever raised from the ocean bed before. She lay right side up in 70 feet of water with the tops of her masts protruding. Cox tried the first time to bring her up in 1926. For months his men worked on her, with four large floating docks to hold the masses of gear necessary. Finally they raised her to the surface with thousands of cubic feet of compressed air pumped into the enormous hull. But their victory was only temporary. They saw the *Hindenburg* list more and more dangerously until it was apparent that she must capsize. To prevent disaster they let her sink again.

For nearly four years more the *Hindenburg* lay on the rocks. Then work on her was resumed in March, 1930. The salvagers made over 800 patches in her hull, one of them measuring 750 square feet placed over the hole where one great rusted funnel had been sawed bodily away. The cost of work on the *Hindenburg* was so tremendous that Cox decided to remove one of the turrets, weighing 560 tons, to sell for ready cash. He did so, but he said afterward that the price he got for it was only a quarter of what it would have been worth had it been left in position.

Once again, for months, more than two hundred men worked to raise the *Hindenburg*. Forty pumps continually forced compressed air into her hull. Around one side of her stern was built a 600-ton block of concrete to steady her as she came out of the water and to forestall any danger of her heeling over again as she had done in 1926. She was raised early in June, 1930. Again she listed perilously to starboard and again was allowed to sink. The salvagers swallowed their disappointment and encased her stern in more concrete. Then a few weeks later she rose again and floated steadily on the surface. The biggest salvaging feat in maritime history had been accomplished. But to Cox, the man who carried it out, it meant no financial gain. He barely recovered the money he had spent on her. But it was

[*Continued on page* 163]

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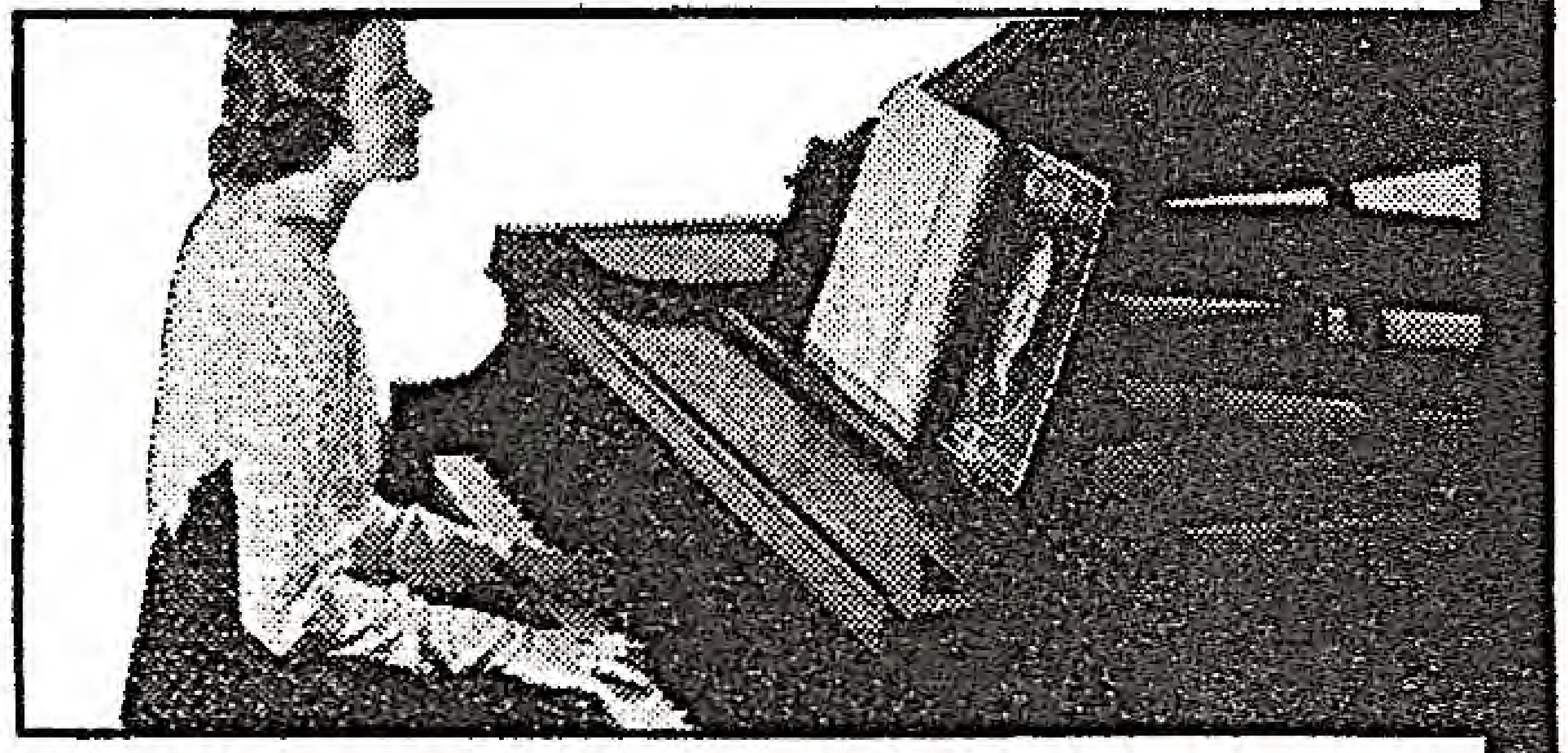

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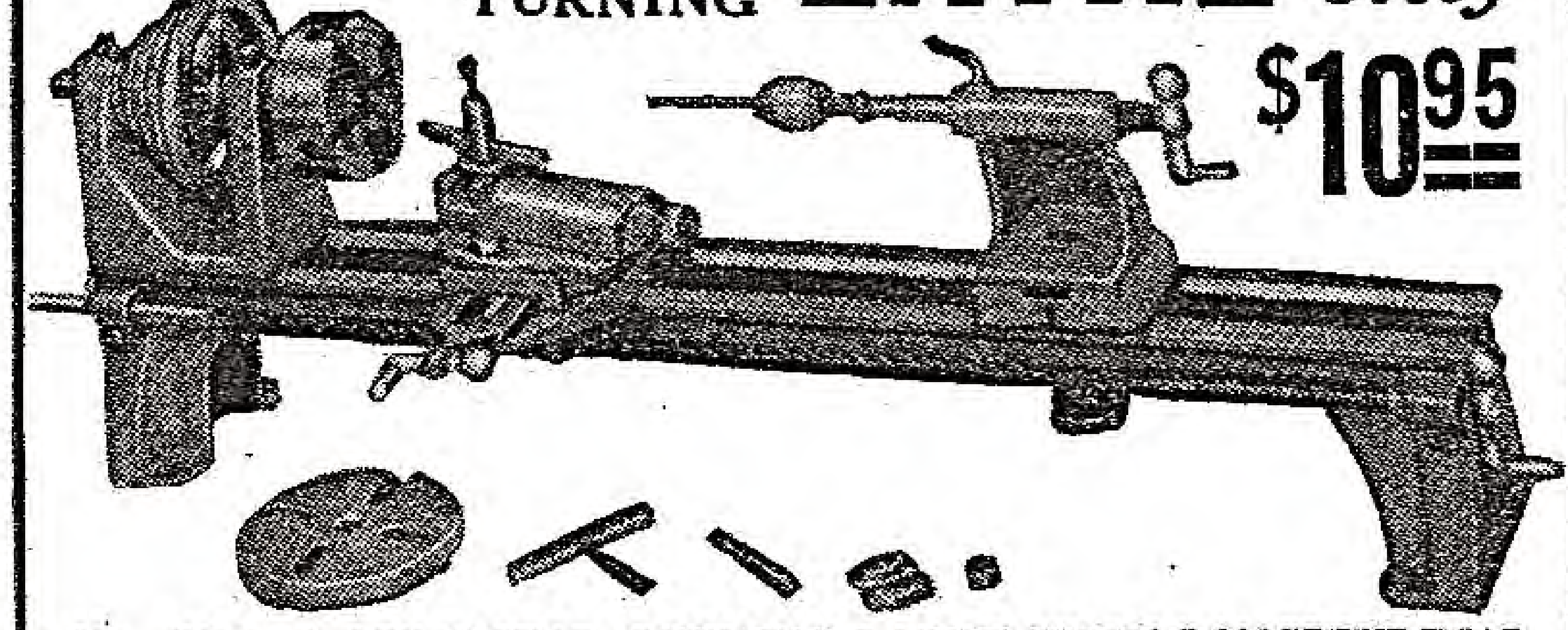

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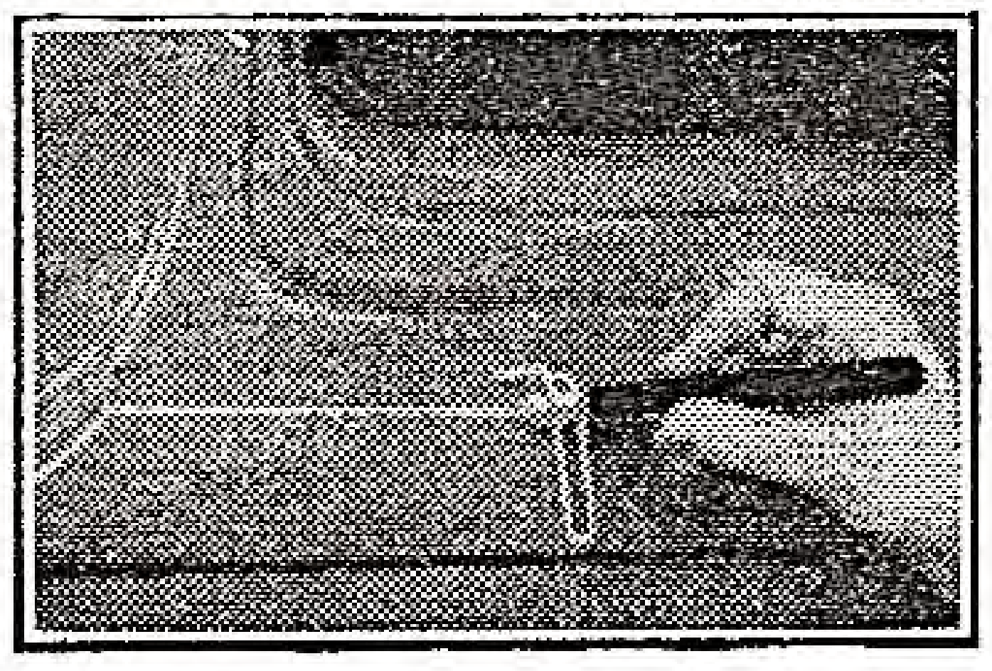

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Raising the German Fleet

[*Continued from page* 155]

the greatest adventure of a lifetime for him. This is how he described it:

"I had spent £40,000 ($200,000) of my money when she beat me and very nearly broke my heart. I did not give up and went on spending money. Then came a day when I had spent £75,000 ($375,000) and in two minutes I was to know whether I was ever to see it again. My man with a lifebelt around him began to sing out the degrees of her list as she was being raised. '2½ degrees' came the message, '3 degrees . . . 4 . . . 5 . . . 5½ . . . 6.' My heart almost stood still. Then '6½.' Here he stopped. Then came the voice, '6¼,' and all was well. I was like a schoolboy, I was so elated."

Next after the *Hindenburg*, the 20,000-ton battle cruiser *Von der Tann* was pumped up from the floor of Scapa Flow. She was found bottom upwards about a hundred yards from the *Hindenburg*. In her case, the prow was lifted first, but she developed a heavy list and was allowed to sink back again. More airlocks were inserted and she was finally brought up in December, 1930. Four men were injured in an explosion during the work on this vessel.

Six months later, the 25,390-ton battleship *Prinz Regent Luitpold* was added to the list of salvaged vessels. She was found in a hundred feet of water. Giant airlocks were made both in bow and stern but when air was pumped into her the stern rose twenty feet into the air, water swirled into her open portholes and again she sank. At the second try the salvagers were successful.

In March, 1933, Cox abandoned the task. In ten years' work at Scapa Flow he had recovered 32 ships and spent more than $2,500,000. Yet at the end of it all he found that instead of making money he had netted a loss of between $50,000 and $75,000. Since he started work the price of scrap iron and copper had slumped to about half of what it had been. He said afterward that the prices fetched by the *Von der Tann* and *Prinz Regent Luitpold* together were less than for a cruiser.

Cox himself kept as souvenirs the bells of most of the ships he had salvaged. All his equipment he sold to the firm of Metal Industries, Ltd., of Glasgow, who took over the contract from him. The man now in charge of the job was a Glasgow Scot named Thomas McKenzie.

In April, 1934, work was resumed on the 28,000-ton battleship *Bayern*, which lay bottom up in twenty fathoms of water, with a list of nine degrees to starboard. As with the other giants, compressed air was used to float her. Seven tubular airlocks between 70 feet and 100 feet long connected the men working below with the surface. The men themselves worked at an air pressure of 50 pounds to the square inch. Night and day for nine months McKenzie and his men toiled on the *Bayern*. She was brought up once but, like several of the ships salvaged by Cox, developed

[*Continued on page* 166]

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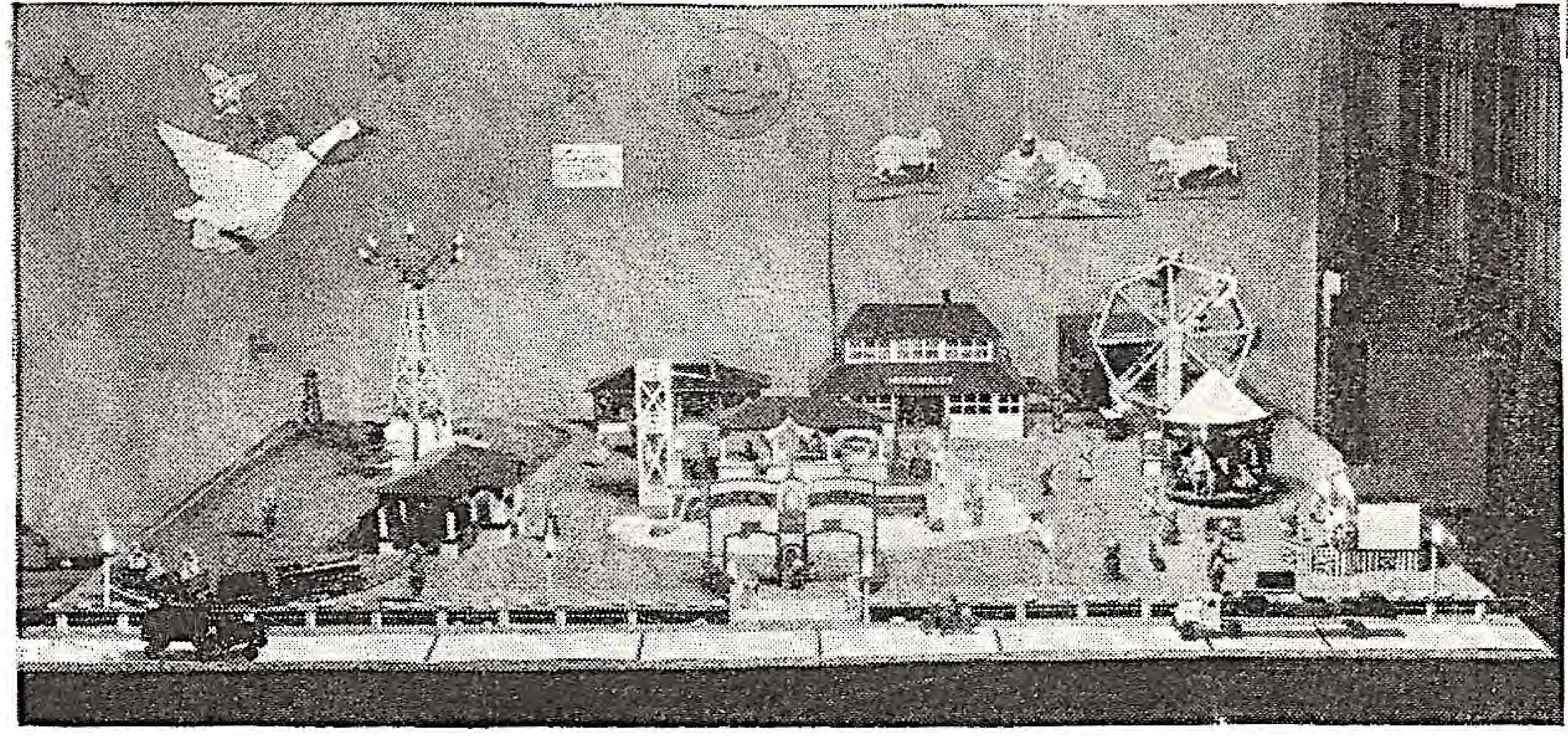
WITH THE HOBBYISTS

Swords collected from the various countries in which he has visited form the interesting collection of Richard Ames, Jr., Houston, Tex. He is shown above with some of his trophies.

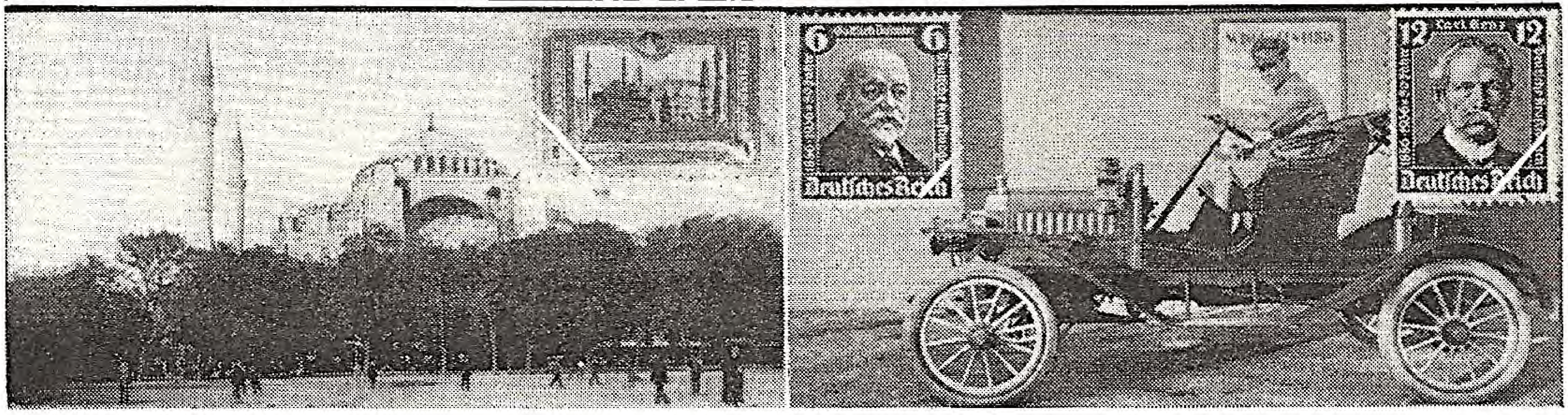
Even the movie stars have their hobbies. Jeanette MacDonald collects small jeweled trinkets and novelties. She is shown here with a portion of her novel collection of porcelain and glass what-nots.

The hobby of Charles Jones of Vancouver, B. C., has attracted people from all parts of the world. His tame bird aviaries include specimens from many lands such as Bengalese and Saffron Finches, Indian Waxwings, Borneo Pintails and others.



Even kings follow railroading as a hobby. King Boris of Bulgaria is shown in the cab of a German express train ready to take over the throttle. Besides being interested in actual railroading he is an ardent miniature fan. Left—This miniature amusement park, a replica of a real park near Williamsport, Pa., was constructed by Donald L. Pysher during spare hours. The park is provided with a Ferris Wheel, Merry-Go-Round, Pool, Dance Casino and other amusements.

PICTURES ADD INTEREST TO STAMP COLLECTING



A Buffalo, New York stamp collector, Montgomery Mulford, finding that he had on hand a number of duplicate stamps decided that he would use them in a special album. A photo album was secured for the purpose and in it were mounted pictures of various scenes used on postage stamps. Above, at left, is a photo showing the Mosque of Se'im II with the Turkish stamp commemorating it. On the right is a picture of an early automobile with the inventors, Daimler and Benz. The stamps shown in each corner were issued by the German government in honor of these men who pioneered in the industry.

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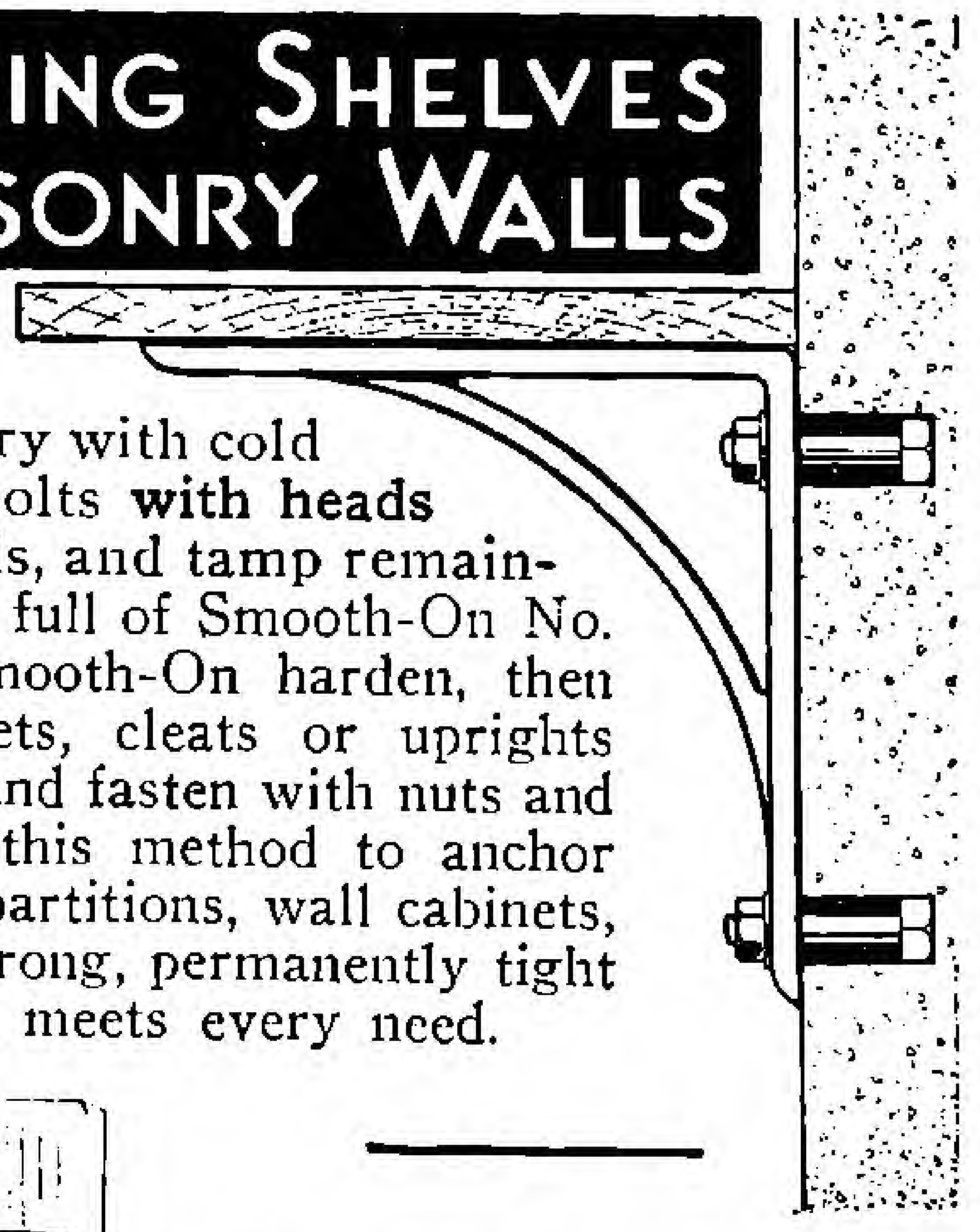
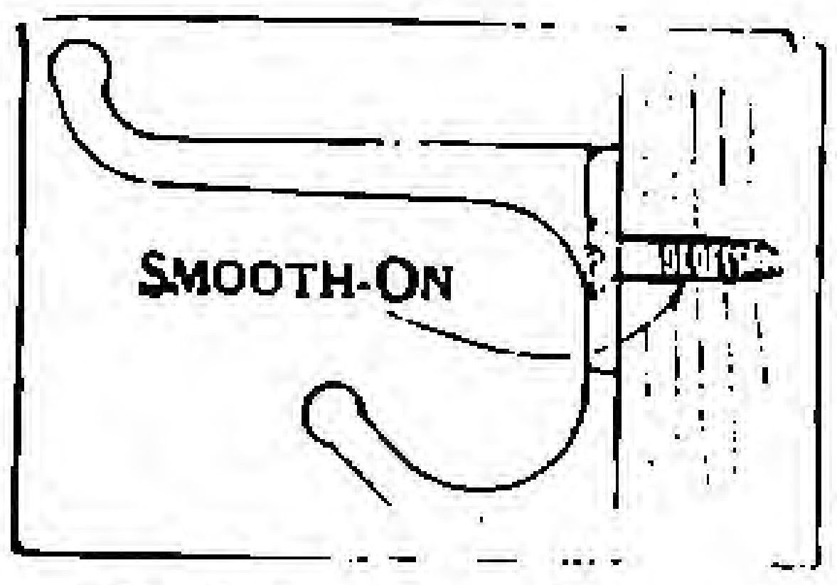
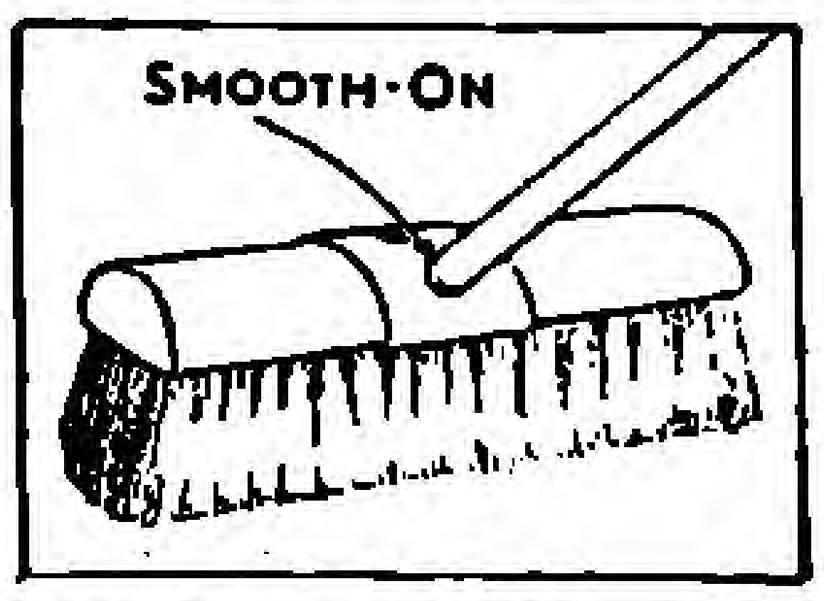


Cut holes into the masonry with cold chisel, insert bolts **with heads in** to form studs, and tamp remaining open spaces full of Smooth-On No. 1. Let the Smooth-On harden, then slip the brackets, cleats or uprights over the studs and fasten with nuts and washers. Use this method to anchor cellar shelves, partitions, wall cabinets, etc. Makes a strong, permanently tight connection that meets every need.



Tightening loose wood screws



Tightening loose handles

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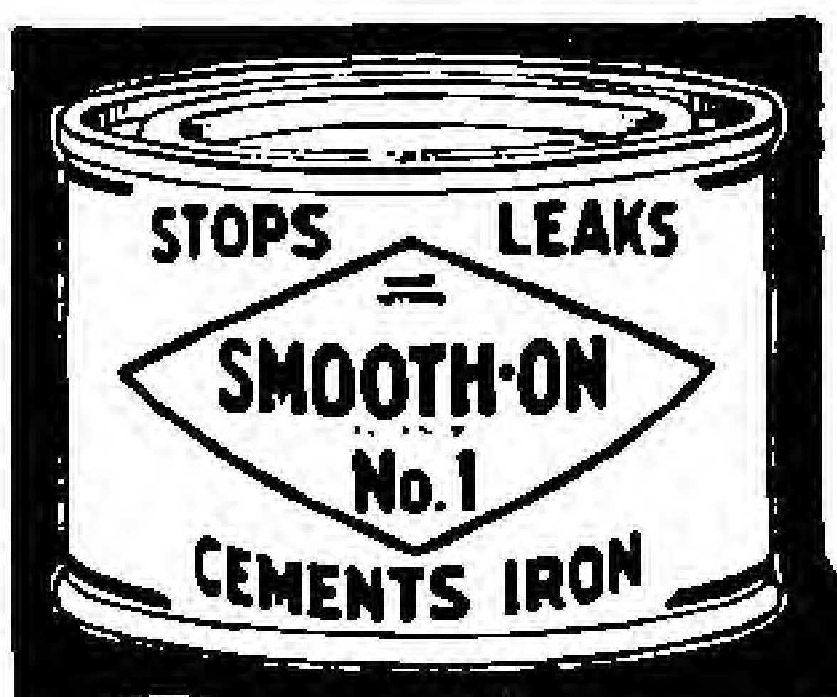
Get the booklet from us and Smooth-On No. 1 in 7-oz., 1-lb. or 5-lb. tins from any hardware store.



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Address ....

12-36 ....

Raising the German Fleet

[*Continued from page* 163]

such a list that she had to be sunk again. Tragedy marred the work on her when Diver John Bee of Portsmouth collapsed and died shortly after coming up from the ocean floor in July, 1934.

One day in September, 1934, the *Bayern* swung to the surface and floated there, bottom upwards. She took just thirty seconds to rise. As she appeared above the surface, columns of water shot skyward, forced out by two million cubic feet of surplus compressed air inside her. Later she was towed 250 miles to Rosyth yards to be broken up. In April, 1936, the *Koenig Albert* was raised, followed only a month later by the 25,000-ton battleship *Kaiserin.*

Ten giant ships still rest on the floor of Scapa Flow, waiting to be salvaged. They are the *Derflinger, Karlsruhe, Koeln, Brummer, Markgraf, Koenig, Dresden, Kronprinz Wilhelm, Kaiser Friedrich der Grosse*—the flagship of Admiral von Reuter—and *Grosser Kurfurst.* So far it is estimated the salvage work has cost approximately $3,000,000. It is not known for certain just how much Germany's once proud High Seas Fleet has brought in the junk market, but it is probably little if any more than the cost of salvaging, owing to the slump in metal prices. Experts estimate it will take another six years before the last ship is salvaged and the curtain is finally rung down on the drama of Scapa.

What Becomes Of Football Stars?

[*Continued from page* 53]

Yale ace and generally credited with being responsible for the re-election of President Wilson in 1916.

McCormick, quarterback and fullback, played his first football at Phillips Andover Academy in 1887 when the now historic rivalry with Exeter was quite young. He was a varsity star at old Yale Field in '91 and '92, being elected captain in his final year.

McCormick's interests expanded rapidly after college. He served as mayor of Harrisburg, Pa., then became associated with banking and industrial activities as well as newspaper publishing.

In 1926 the magic of an eighteen-word shipboard interview with an infrequently-quoted financial figure lifted the value of General Motors stock $140,000,000 in two days.

The astonishing rise was ascribed to the words of an ex-football player, Thomas Cochran, Yale substitute on the team captained by Vance McCormick in 1891-93.

A member of the firm of J. P. Morgan, he created a sensation one Saturday night aboard ship as he received Morton Nichols of the Wall St. Journal and said quietly, "I think General Motors is being undervalued at the present time. It should sell 100 points higher."

[*Continued on page* 169]

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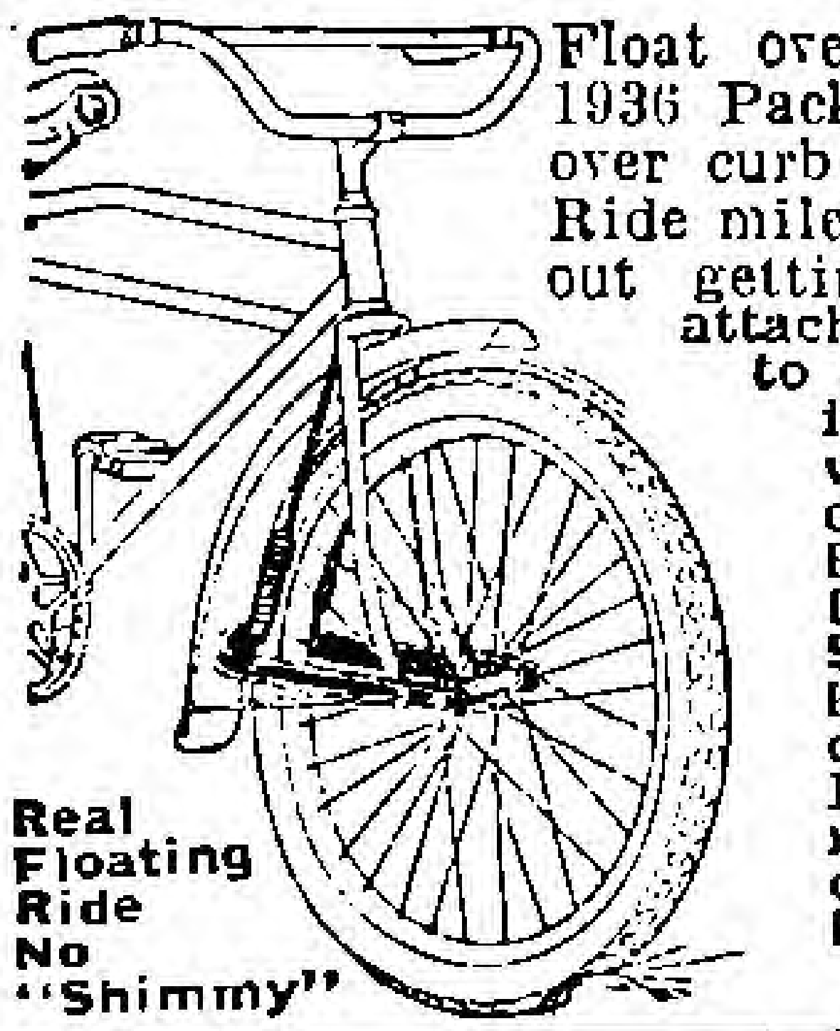

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Dear Mac: Please forward me your catalog. I want it to add to my travelling souvenirs. I am working in a modern garage although I have been out of school only four weeks, thanks to McSweeny Training. My best regards to all. M. Klushauk

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Dear Mac: Just a few lines which might interest you. I left your school two years ago last May. Since I left I have not seen a day I could call "hard times." I have been working ever since I left and have averaged in my earnings $173.00 a month, in spite of the hard times. Many thanks. Thos. J. Sharp

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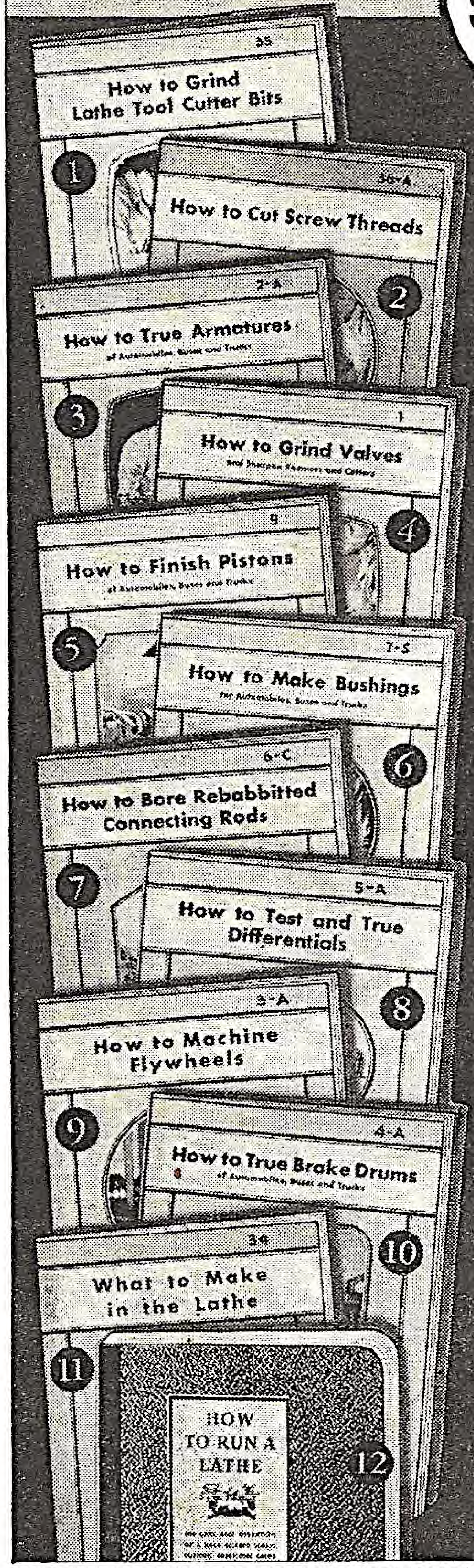
35
How to Grind Lathe Tool Cutter Bits
1
36-A
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HOW TO RUN A LATHE
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SOUTH BEND *Precision* LATHES

What Becomes Of Football Stars?

[*Continued from page 166*]

In mid-season 1899 Yale's football fortunes seemed to be ebbing. The Blue had just suffered a humiliating defeat at the hands of Columbia. As the undergrads took seats in the stands a rangy figure in the leather jacket, canvas pants and shin guards of the period raced onto the field. A roar of acclamation went up ". . . It's George Cutten . . . He's back! . . . Go to it, George . . !"

It was George Cutten, today holder of countless degrees and president of Colgate University but then principally known as the veteran center rush of 1897-'98 who had entered divinity school two months before. George had come back to help the team, a gesture toward the Yale football tradition he so loved. Eligibility rules were a comparatively lax matter in those years and he rendered valiant aid as a post-graduate.

Even as the Negro race has contributed great football players to the game it has developed stars who have become successful in after-life. Outstanding is William H. Lewis, Harvard center and acting captain. Lewis attracted wide attention in 1924 when, as a former United States Attorney in Washington, he denounced the Republican party for its connections with the Klu Klux Klan.

To college football belongs the prototype of Penrod, Booth Tarkington's literary brain child. He is Keyes Winter, Municipal Court Justice in New York, Yale end in 1899 and a juvenile pal of Tarkington's. Mutual acquaintances insist that it was from the personable young Keyes Winter that the renowned novelist drew his word picture of a typical American boy.

Winter weighed only 135 pounds when he was a fellow Eli gridder with Cutten and Fincke but for a little man they say he made a sizzling wingman, fast and courageous.

Possibly the most glamorous football leader of the Yale of 1890's was George T. Adee, a coach for many years and today a member of the Stock Exchange firm of Bacheller and Adee. George Adee's team in '93 beat every opponent but Princeton. In '94 he quarterbacked Yale to an undefeated season during which the Eli's vanquished both Princeton and Harvard.

The men described in this article are no exceptions. Edwards, Frazier, Cochran, McCormick, Adee—they are flesh and blood examples of the value of football in training youth for life. Today, with football being played at a hundred universities for every five of the Nineties, the moral force for good is twenty times stronger.

Greed Traced To Child Indigestion

Children who cannot digest their food may later develop greed for food and then excessive greed for money, reports the famous Viennese psychologist, Prof. Alfred Adler. Many money magnates have suffered from lifelong digestive disturbances, he points out.

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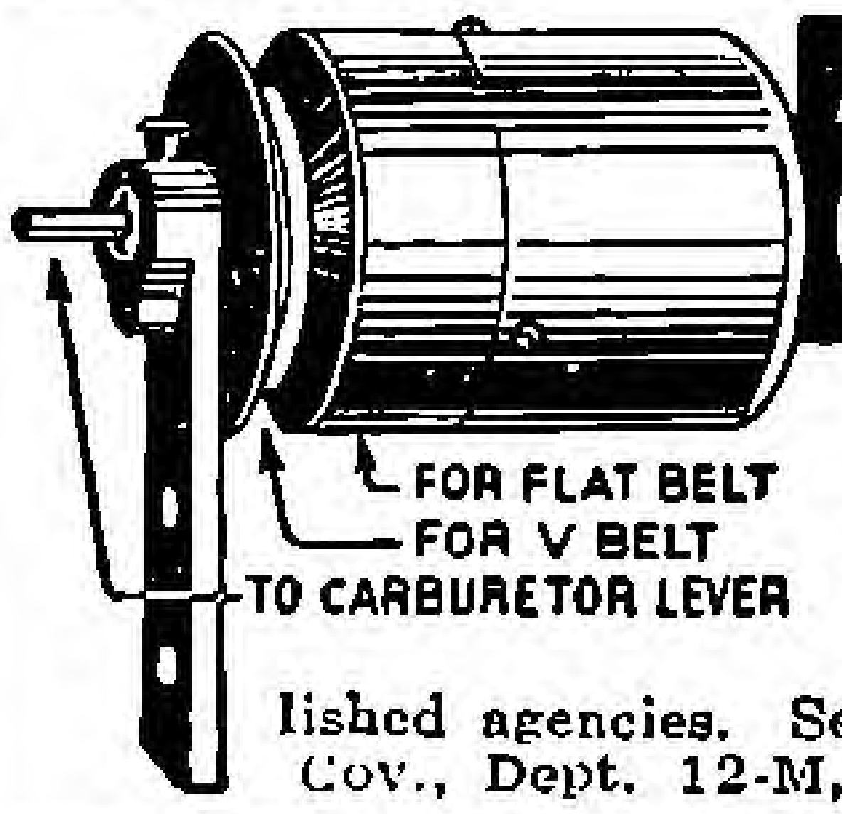

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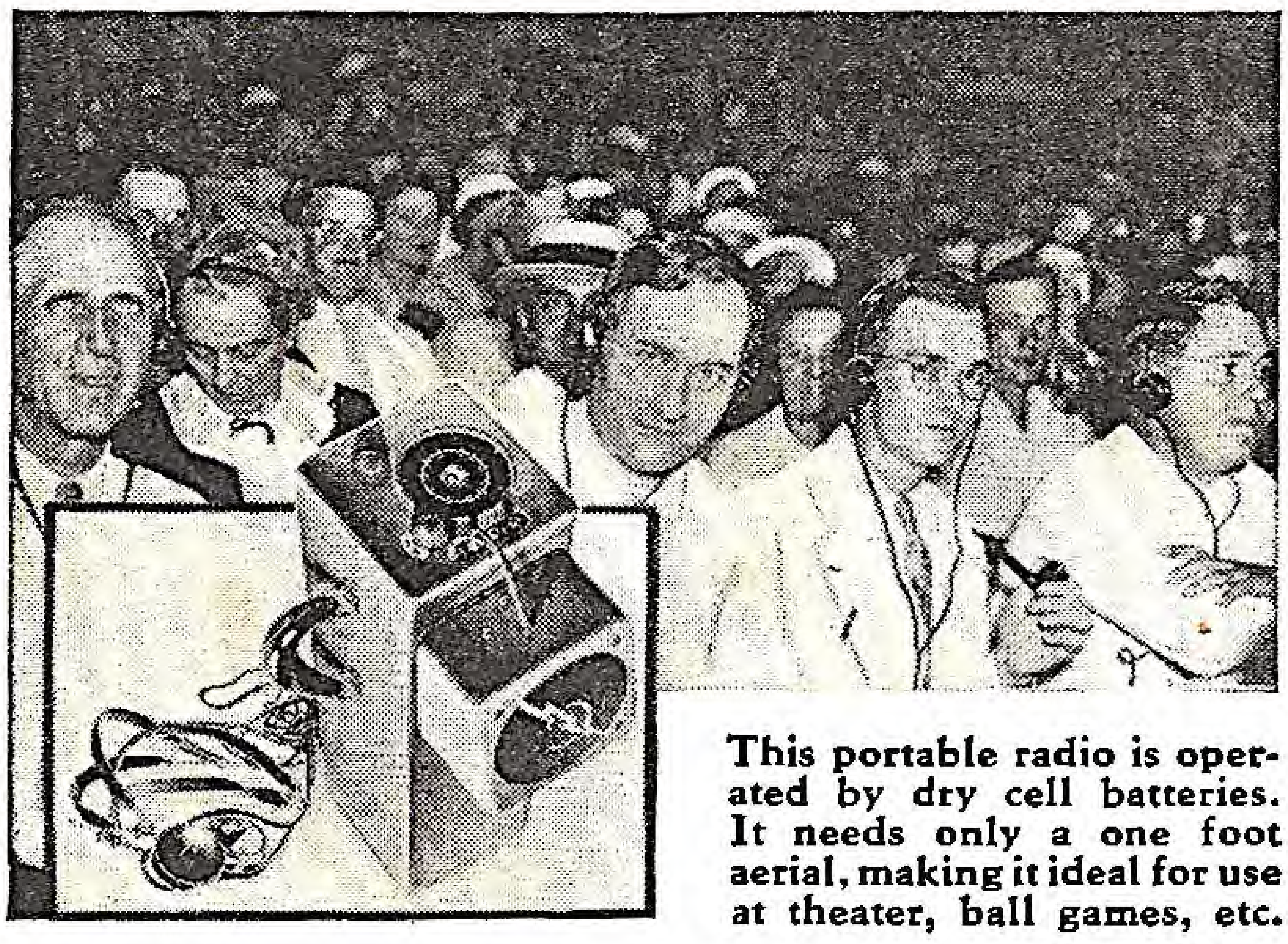
New Ideas Meet Changing Business



This portable radio is operated by dry cell batteries. It needs only a one foot aerial, making it ideal for use at theater, ball games, etc.

A new type shovel-barrow is so designed that it can be loaded by merely pushing its nose into a pile of dirt. Pressing on a foot treadle then throws the load into the body of the barrow.

Valves and valve seats made of an alloy of cobalt, chromium and tungsten are meeting the favor of truckmen. They give service of as much as 100,000 miles before needing regrinding.

A water-tight bolt for use in wood presents a construction that prevents the entrance of water into the bolt hole thus checking damage from decay.

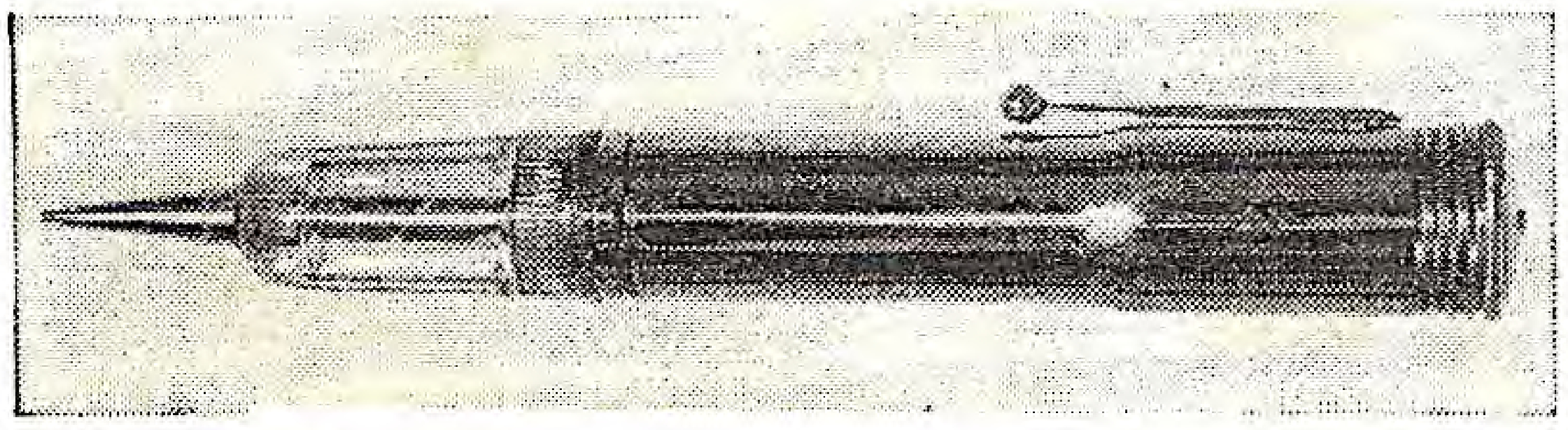
A portable barrel stave manufacturing plant mounted on a truck to serve rural areas is powered by Diesels.

A new sketching board makes it possible for homecraftsmen of limited experience to make perfect perspective sketches of objects.

A pocket stereoscope gives greatly magnified, three dimensional views from specially made movie films. It is made of molded plastic.

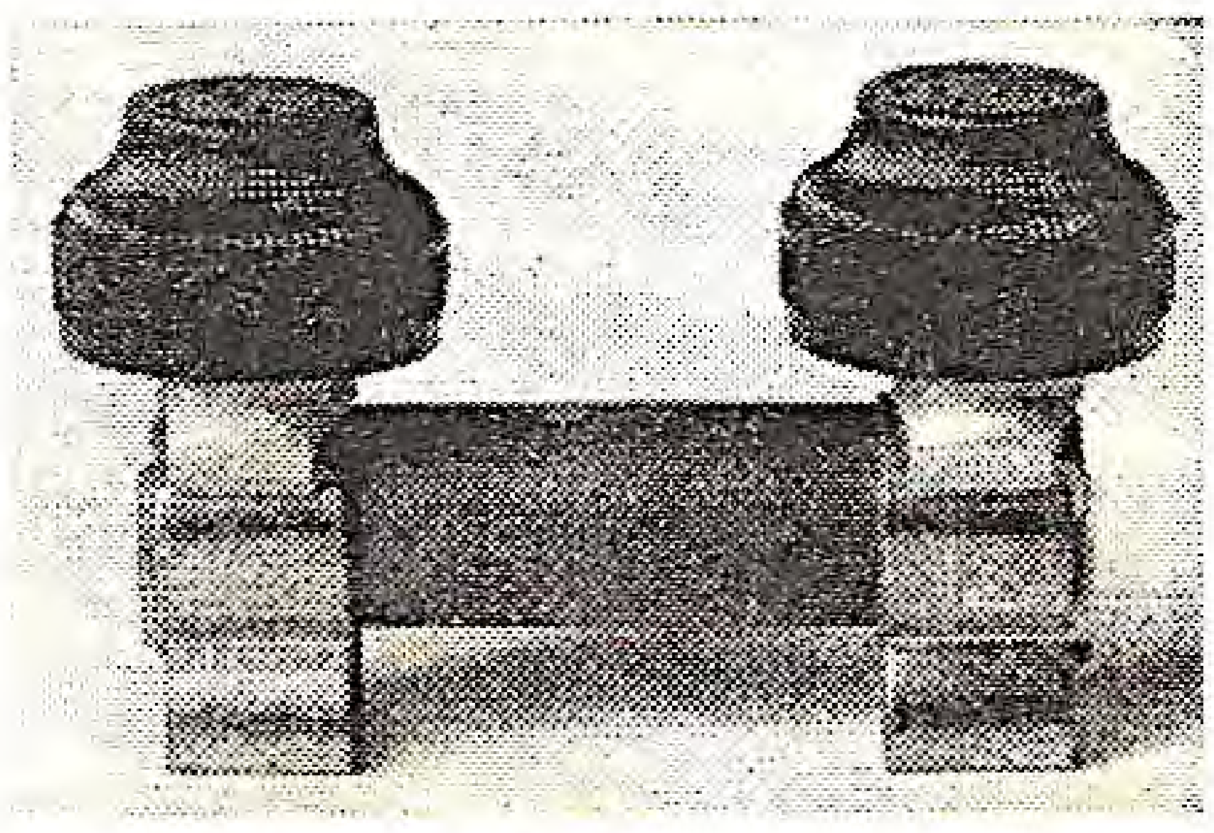
An auto battery with a special power-saving cover that prevents damage and short circuits due to the formation of corrosion is guaranteed against repairs and replacements.

A winter windshield wiper melts and removes sleet. It is detachable and refillable.



Developed for ushers' use in darkened theaters, this pencil carries its own built-in flashlight. The lead is adjustable.

A filmless moving picture projector for use with window displays minimizes fire danger. A disc replaces the usual film.



These fuse clip clamps have insulated knobs designed so pressure of fuse clips can be regulated to insure positive contact.

A full jeweled low-friction indicator device shows any variation in the round or angular edges of objects.

A new electric organ enables music lovers to see as well as hear music. Through an attachment, the colors of the spectrum intermingle in harmony with the notes played creating wonderful sound and color effects.

Furniture ranging from desks to bookcases is now being made from sheets of material made of wood fibres compressed under great heat and pressure.

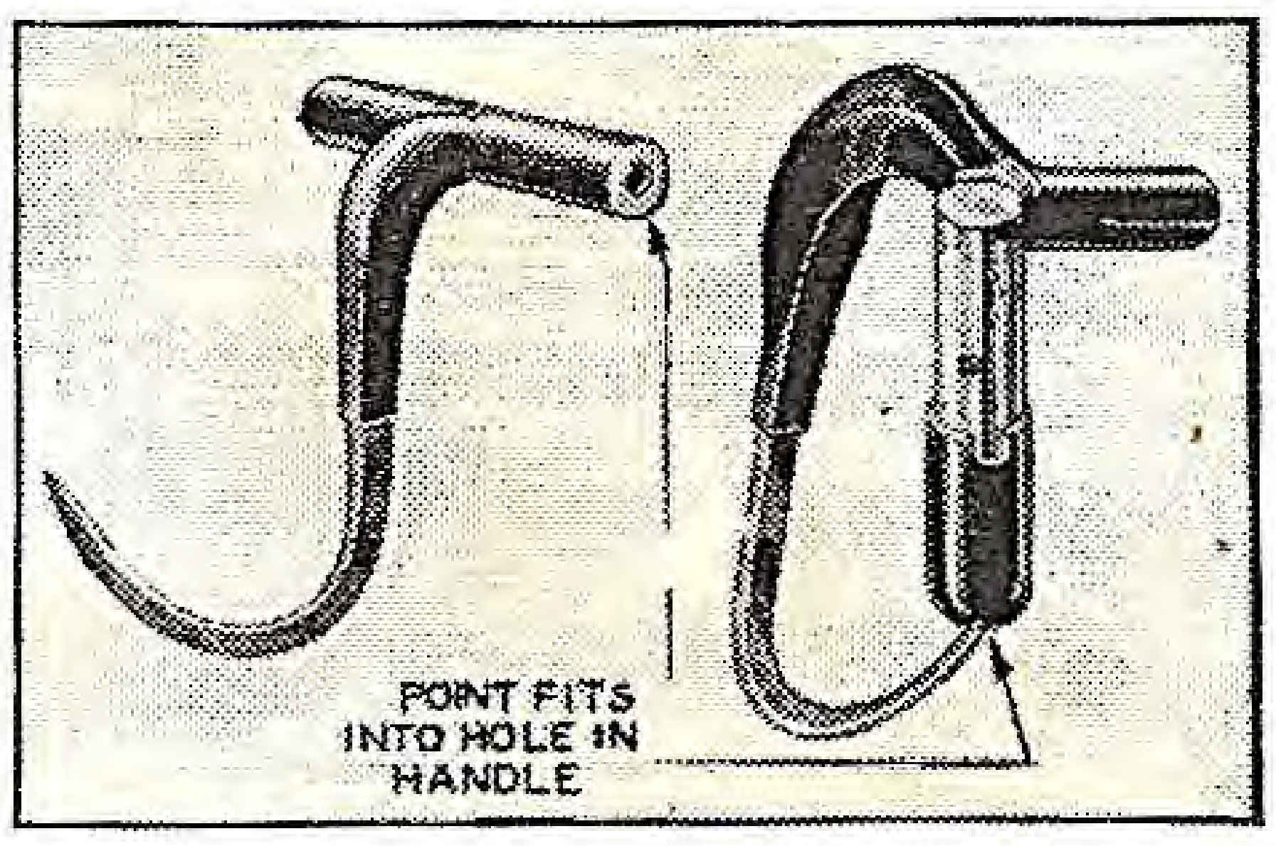
A floor sanding machine that vacuums the dust it makes while sanding is finding a market in the home repair field.

A game board that enables more than 50 different games to be played upon it is becoming popular.

A device for use on all types of internal combustion engines renews, purifies and decolorizes the crank case oil while the motor is running.

A small handsaw cuts metal, wood, fibre, or composition material of any size or length. It cuts on a straight line with no limit to depth of cut.

New combination desk sets feature an ink well, a clock, a lamp, and a built-in radio receiver. They are made of molded bakelite in a wide range of colors.



Express and freight handlers will appreciate the safety factor of this new hook. When carried in pocket its point is guarded.

Editor's Note—Addresses of manufacturers of these and other new products in this issue can be obtained by sending a stamped, self-addressed envelope to Modern Mechanix Publishing Co., Information Bureau, Fawcett Building, Greenwich, Connecticut. Manufacturers are invited to submit material for publication on this page.

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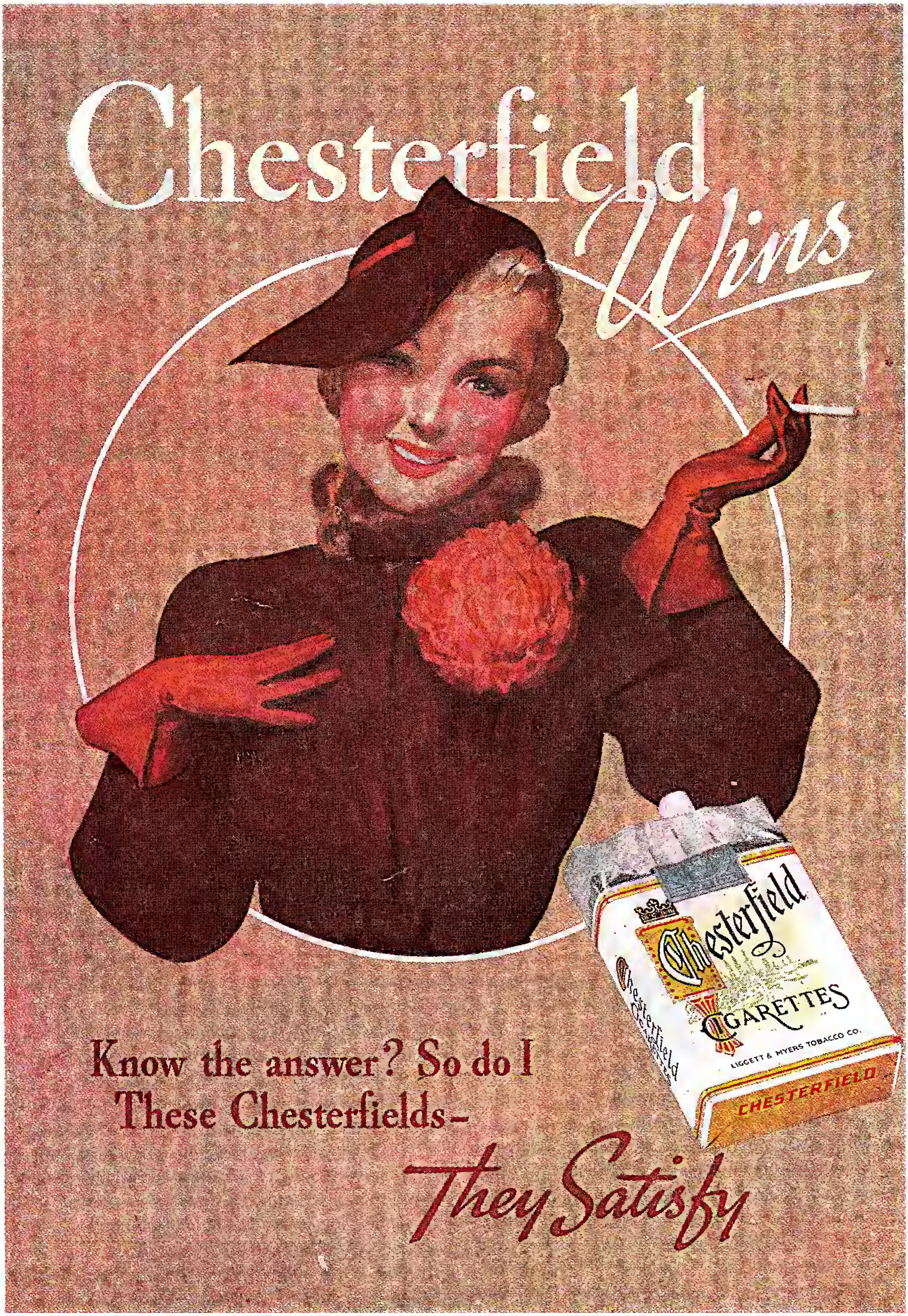
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A frank man to man talk about PATENTS-INVENTIONS -SELLING INVENTIONS

THE world of invention moves on. About a hundred years ago people were saying, "There's nothing left to invent"—today we know that is one of the funniest things ever said. Just think what has happened in the last hundred years! Autos, radios, airplanes, and thousands of useful, practical devices for home, shop and office have been invented and put on the market. Inventors are constantly making the world a better place to live in. Did you see a notice in the paper that an obscure worker, Hans Wach, has invented a simple device to utilize exhaust steam on steam boats. *Already, the report states, the steam ship lines have saved more than $15,000 in fuel bills with his invention.* Almost in the same breath the Dept. of Commerce announces that it will soon test out a new non-crashable aeroplane, which the average man can learn to fly in a day, which will travel at 110 miles an hour and sell at the price of a cheap automobile. An unknown Seattle man has invented a robot to go 5,000 feet under the sea and recover millions and millions of dollars worth of gold lying at the bottom of the ocean since the days of the early Spaniards.

Remember this: For every outstanding big invention there are thousands of small, simple things for use in the home, the office, the factory, on the farm, on every sort of travel conveyance. Little articles like you find on the counters of a 10-cent store, hardware store, drug store, toy and novelty shop.

Many Little Ideas Have Big Commercial Possibilities

A person finds something he's using doesn't work right, or it's clumsy, or costs too much. He gets a happy thought. He improves the old Article. That's contribution to human progress. That's the way that many, many men have reached the goal of financial comfort, independence and even wealth. Most of the things millions of us use didn't come from the brains of engineers and physicists. They came from the mind and maybe the crude home work bench of Mr. Average Man, busily engaged in earning his bread and butter at whatever chance or circumstance has given him to do. The "little" man's opportunity as an inventor was never greater than it is today.

Who Are Inventors?

You'd be amazed at the men we contact in the course of a busy year. Most of them do not consider themselves inventors at all. During their work or leisure they get an idea. They work it out on paper. They get in touch with us about Protection. Did you know that a dentist invented the stock ticker, a school teacher the telephone, a farmer the typewriter, an artist the telegraph? Did you know that the crinkly hair pin—sold by millions now—came about because a husband saw his wife twisting the old-fashioned straight hair pin to make it stay in place? Poor men who have no thought of invention now will be financially well-fixed in a few years because of a happy thought that the world could use to advantage.

Can You Answer These Questions?

Ask yourself these questions: How do the Patent Laws protect me? What easy steps can I take, without cost, to put myself in position to support my belief that I am the first man to think of my invention? Is a Patent worth the cost? Do I need a model? Should I try to sell my invention before I have it Patented? Is there any sure, business-like way to secure financial help? If I do apply for a Patent how shall I reach people who can market my invention? Can I protect and sell an improvement on some invention that has already been patented? These are but a few of the questions which usually confront the average man. We have the answers! YOU CAN HAVE THEM, without cost, trouble, or delay.

Our Business is To Help You. Write Us Today

For more than thirty-six years, this firm has been helping men with an inventive turn of mind. We maintain a large staff of trained, experienced specialists—Registered Patent Attorneys, Draftsmen, and Searchers to help our clients secure all the protection to which they are entitled. Fees are reasonable. Deferred payments frequently arranged. Questions promptly answered. Write us frankly with absolute assurance that what you say will be treated with strictest secrecy. But FIRST, send for the FREE BOOKS shown on the opposite page. They are filled with facts, pictures and suggestions. They tell you things about Patents, Inventions and Selling Inventions that we have learned in our long experience. They may save you time, expense, EVEN LATER DISAPPOINTMENT. Simply fill in the coupon. No charge, no obligation. Write us today.

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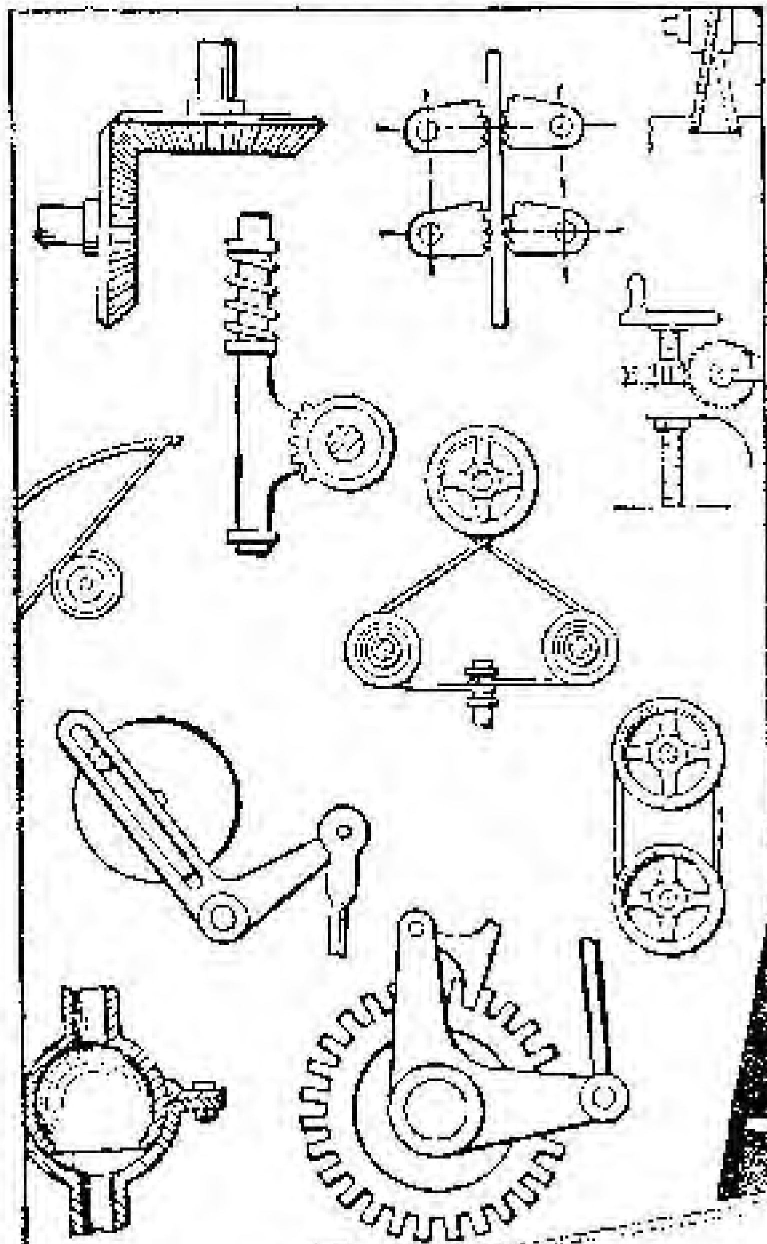

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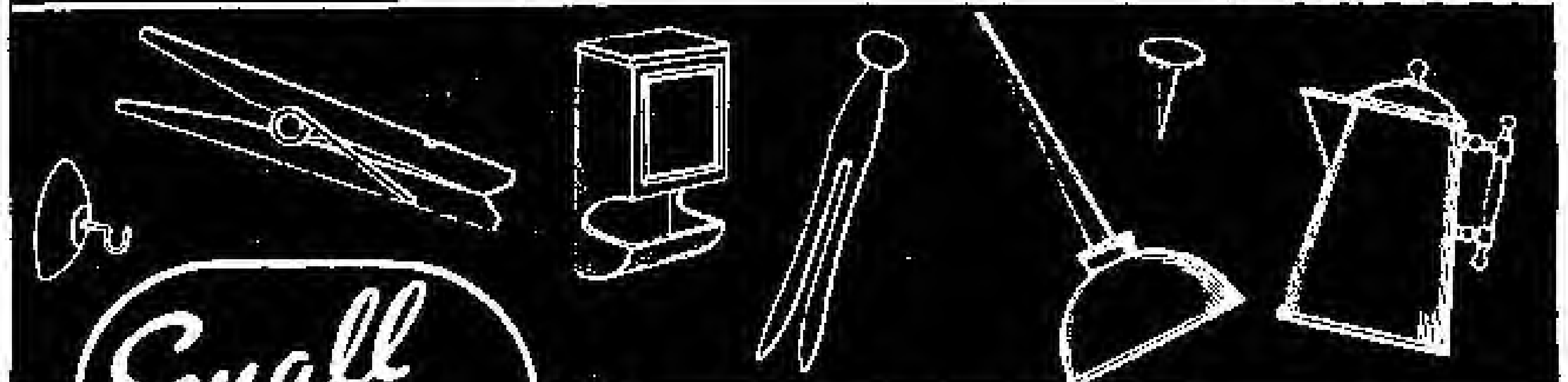
INVENTORS



Small Ideas THAT HAVE BUILT BIG BUSINESSES

IDEAS do not have to be complicated to be profitable when Patented. The 5c and 10c stores flourish on simple Patented products which are commercially successful. The zipper, safety pin, thumb tack, paper clip, collar button—all simple, yet familiar inventions—brought their inventors rich rewards. If you have a Patentable idea act to protect it. Many of the most useful, widely popular, greatly profitable, and extremely successful inventions have been very simple ones. You have only to look at the devices we have pictured here to realize how a simple idea may become a utility bought by a hundred thousand or a million people soon after it is produced. Don't be afraid that the simplicity of your idea makes it valueless. The thing that you find so simple that you wonder why a thousand other people haven't already done it is often the invention worthwhile.

HOW OTHER INVENTORS GOT STARTED

The list of men who succeeded in invention with only a poor boy's start is a very long and noble one. Poverty, hardships, lack of friends, distance from the market—these could not hold back Bell, Edison, Eastman, McCormick, Whitney and others. Everyone cannot succeed. But every man can try. Courage, sacrifice, and hard work may bring you a measure of the success these men had. Lack of mechanical ability is not a serious draw-back. You can always get someone able to build a model, draw a detailed design, or otherwise materialize your idea for you. The big draw-back is discouragement.

Your idea for a practical article or an improvement upon an old one should be patented NOW. Frequently many of the thousands of applications filed in the U. S. Patent Office each year are for the same or almost the same idea. In such a case, the burden of proof rests with the last application filed. Sometimes a delay of even a few days in filing the application means the total loss of the patent. LOSE NO TIME.

The entire time of this large and experienced organization is devoted exclusively to patent and trade-mark cases. We know the rules and requirements of the Patent Office. We understand the technicalities of Patent Law. We can proceed in the quickest and safest ways in preparing an application for a patent covering your idea.

FREE

The Biography of George Eastman

Views of the man who used Patent Protection to amass millions and give perfection to a new art. Photography—itself one of the greatest inventions.

INVENTOR and BUSINESS MAN

CLARENCE A. O'BRIEN & HYMAN BERMAN

317-R ADAMS BUILDING **WASHINGTON, D. C.**

Registered Patent Attorneys Before U. S. Patent Office

Act Now TO PROTECT YOUR IDEAS WITH A U.S. PATENT

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FOR THE INVENTOR
ARENCE A. O'BRIEN
REGISTERED PATENT ATTORNEY
WASHINGTON, D. C.

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The **FIRST IMPORTANT STEP** in **SECURING A PATENT**—is to obtain the services of a Registered Patent Attorney. The U. S. Patent Office advises that you secure the aid of an experienced Registered Patent Attorney to prepare your statements. Establish the date of your invention as explained in our book and disclose your idea to him in correct form. He then makes a SEARCH of the Patent Office Records and reports to you on existing U. S. Patents which might bear on your invention, giving his opinion on the advisability of proceeding and filing formal application.

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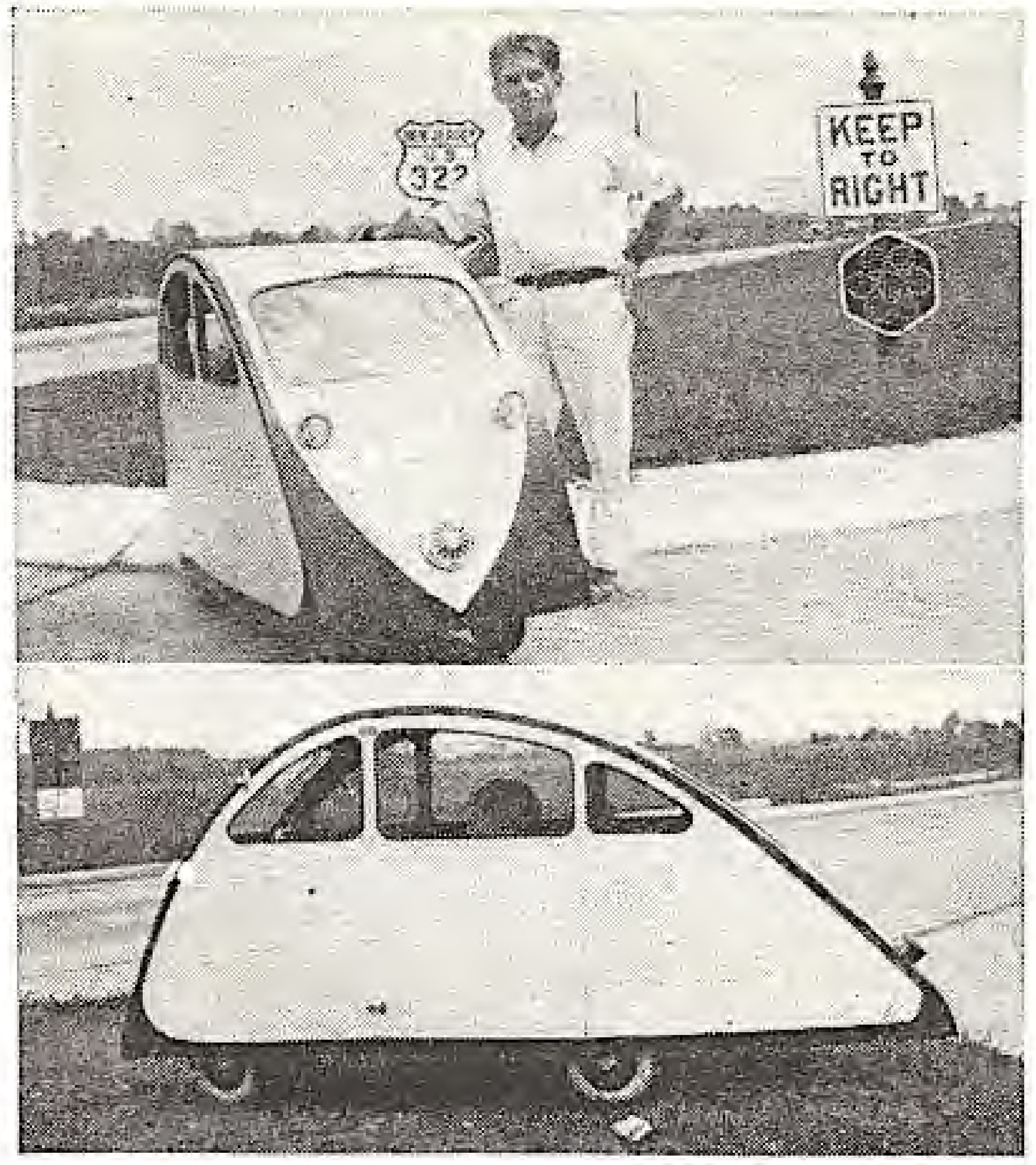
(Please write or print plainly)

Random Chips from the Editor's Workbench



Top—Bill Simmermon of Williamstown, N. J., and the novel midget auto he built. It is powered with a converted washing machine motor. Bottom—Side view of plywood covered body.

GOOD news for thousands of MM readers who live in the New England States! You can now tune in on the MM radio broadcast over the Yankee Network every Sunday between 12 and 12:30 P. M. Stations in the network are:

WNAC—Boston, Mass.
WTIC—Hartford, Conn.
WEAN—Providence, R. I.
WTAG—Worcester, Mass.
WICC—Bridgeport, Conn.
WCSH—Portland, Me.
WSAR—Fall River, Mass.
WNBH—New Bedford, Mass.
WLLH—Lowell, Mass.

Tune in on this program, readers, and help yourselves to a half hour of real enjoyment.

***

The increasing amount of mail and photographs that are finding their way to the Editor's Workbench supply ample proof that a workshop, no matter how small or how limited its equipment, still constitutes a lure that few red blooded men or boys can resist. Boats, model planes, midget racers and sleds seem to be the favorite projects at this time.

MM is pleased to note this increasing interest on the part of its readers and will endeavor to continue presenting workshop projects that will appeal to both experienced and inexperienced craftsmen. Send in your letters and photos relating to the hobbies enjoyed by you and your friends.

Atop the mailbag this month is a letter from Bill Simmermon, of Williamstown, N. J., in which he writes:

Williamstown, N. J.

Dear Editor:

I am sending some photos of a little car I recently built from ideas obtained from MM combined with some of my own.

The little car has been approved by the Motor Vehicle Department here. It is powered by a Briggs and Stratton washing machine motor, and does from 14 to 16 m.p.h. on good road.

The body consists of three pieces of plywood, the doors, windows, and other openings being cut out after assembly. I will be glad to answer any questions your readers may care to ask with reference to my little car.

Bill Simmermon.

Mr. Simmermon's novel auto will probably appeal to many MM midget auto fans who will want to take advantage of his kind offer to supply details. Be sure and enclose a stamped, return envelope if you write to Simmermon.

The $5 award for this month's most interesting project photo goes to Mr. Simmermon, with awards of $3 each going to the senders of the remaining photos that appear in this month's Editor's Workbench.

***

Elbert J. Weathers, of San Diego, Calif., sends in a photo of a gas-powered airplane model that is one of the best we have seen. He was awarded $3 for his model photo and the description of it which appears in his letter:

San Diego, Calif.

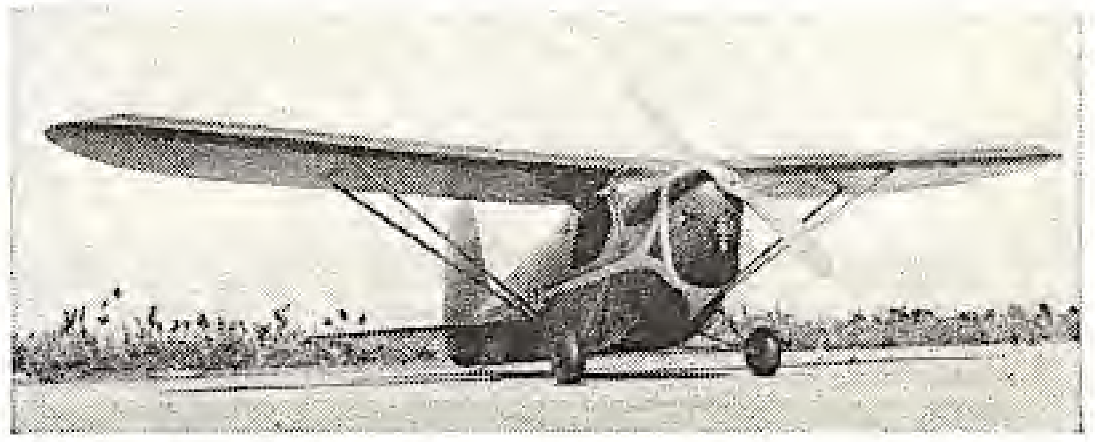
Dear Editor:

Enclosed is a photo of my new gas-powered model plane, known as "Tubby" locally. It is my own design and is powered with a tiny ELF engine which, because of its smallness, enables a correspondingly small gas model to be built.

My model has a wing span of 4 ft., 4 in., and weighs only 28 ounces ready to fly. It is my idea of how a large one-place light airplane should look. The model flies slow and makes three point landings.

I don't see how any home craftsman can afford to be without MM. The ideas and projects presented monthly are always new and ever appealing.

Elbert J. Weathers.



"Tubby," a beautifully designed gasoline-powered model constructed by Elbert J. Weathers of San Diego, Calif. Using a 4-ounce motor, total weight of plane was held to 28 ounces.

Gas models are becoming increasingly popular in the field of model aviation and we are pleased to see an MM reader contributing such a clean cut design to promote progress of the hobby.

***

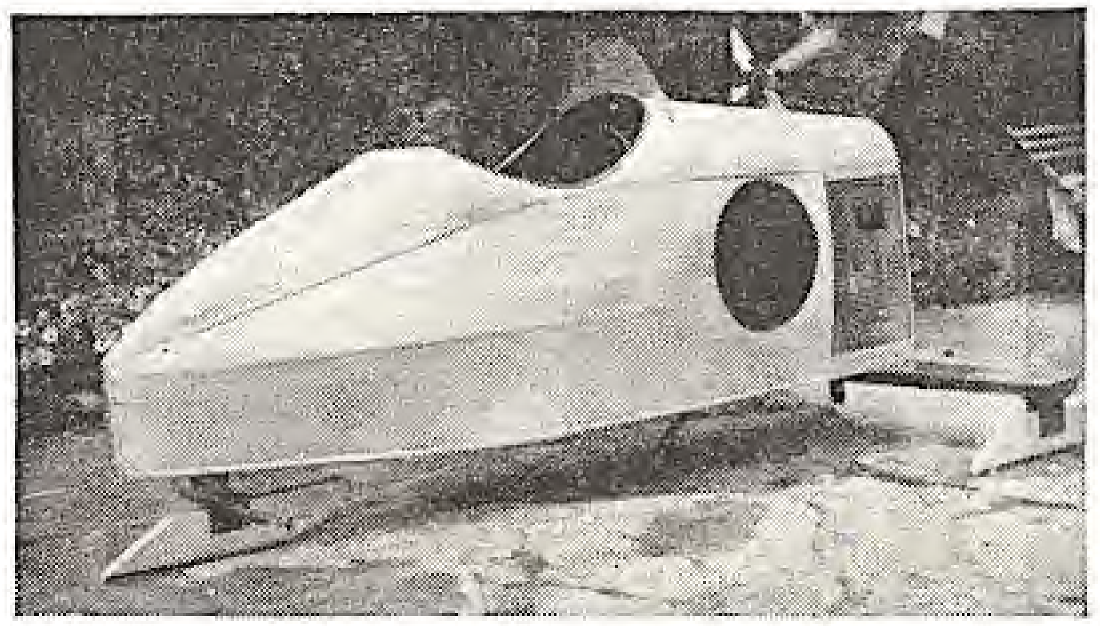
The Automatic Voting Machine Corp. calls our attention to an incorrect minimum price quotation on their machines in our November issue. This should have been $880 instead of $860. Most of the models cost more than this, the price being in proportion to the size of the election and primary ballots in the various states. These vary a great deal. While making corrections, Willard Proctor, editor of the *Grand Saline Sun*, asks us to explain that the salt-built Texas Centennial information booth illustrated last month is not in Dallas but in Grand Saline, Tex., where a lot of fine salt originates.

***

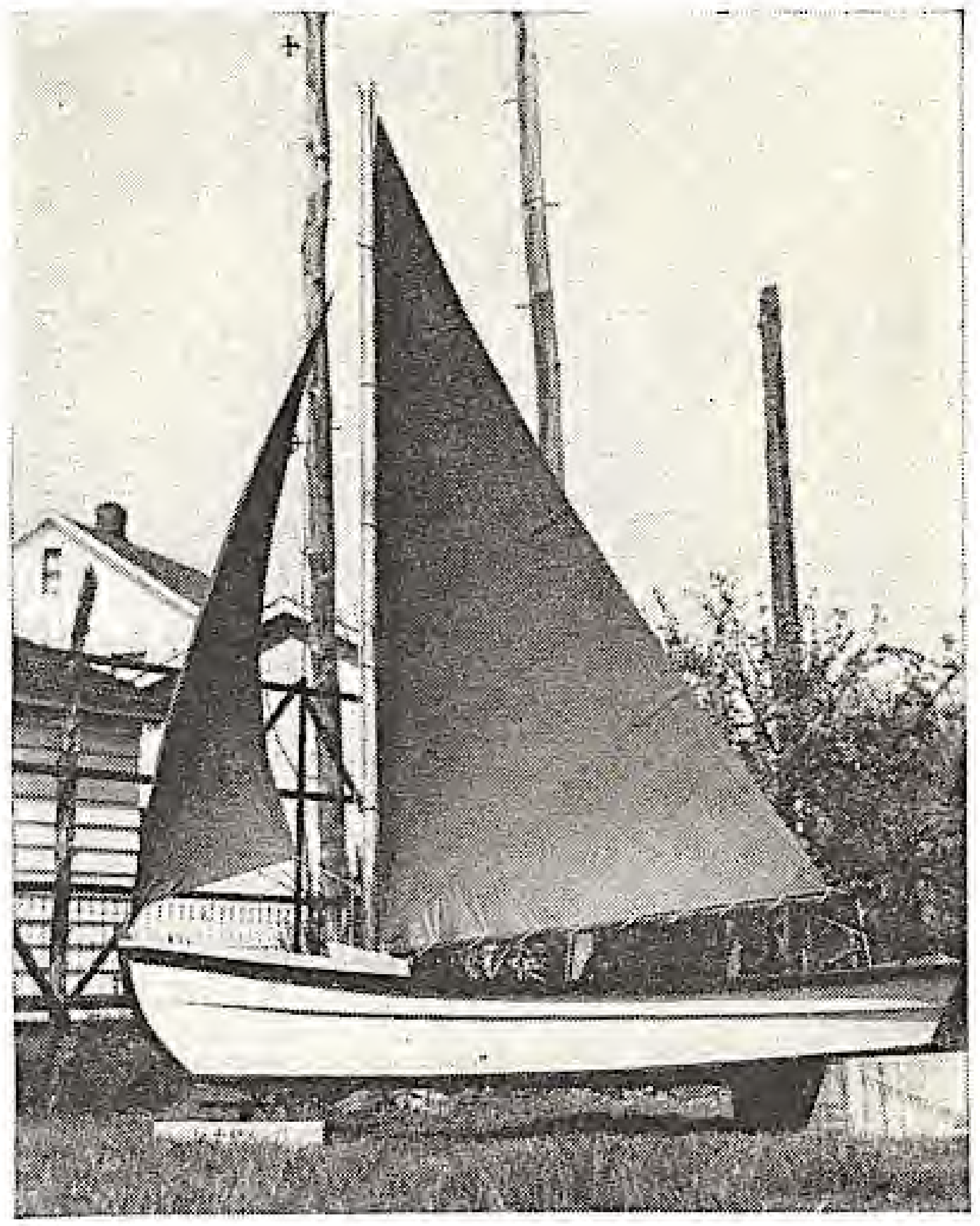
We mourn the death of Fred Hornby. A glimpse of a crane in action gave him the idea for making Meccano toys. He started in a one-room workshop in Liverpool in 1900. When he died Sept. 21 at the age of 73, the factory covered five acres and employed 1,500 persons and he was a former Member of Parliament.

***

With the approach of the winter sledding season we were expecting to receive some good photos of powered snow-sleds and a glance at the photo submitted by Charles K. Burval, of Des Plaines, Ill., proves that we were not disappointed. His letter says:



Picture yourself zipping over the snow at whirlwind speed in a powered sled like this one built by Charles K. Burval of Des Plaines, Ill. A Harley "61" engine and propeller power it.



Doesn't this trim sailing craft tempt you to start work on a boat for next season? Its the proud possession of George Zunner of Hartford, Conn., who built it from MM boat plans.

Des Plaines, Ill.

Dear Editor:

I am enclosing a snapshot of my Aero-drive sled which I wish to enter in your monthly workbench contest. It is 7 feet, 10 inches long and 4 feet between runners. The propeller is chain driven by a Harley "61" motor. I use a steering wheel for controlling the rear runner. All the controls are within reach of the operator of the sled. Hoping you can use the photo, I remain,

Charles K. Burval.

We can always use good clear photos of interesting projects and Mr. Burval was awarded $3 for his photo and description of the sled which is giving him much pleasure outdoors.

***

Boat building still attracts the majority of MM craftsmen and George Zunner, of Hartford, Conn., sends in a photo of a trim little craft. He says:

[*Continued on page* 26]

PLAY SAFE *and* SAVE

FIND YOUR CAR ON THIS CHART

IMPORTANT! The price per gallon of an anti-freeze means nothing unless you know *how many gallons* you will need during the *entire* winter. You can't get that information on a boil-away anti-freeze. But you *can* get it for "Eveready Prestone" anti-freeze . . . and here it is. See how reasonably you can get two-way protection *all winter long* against both freeze-up and rust with *one shot* of "Eveready Prestone" anti-freeze—one shot because it won't boil off, no matter how warm the weather gets between the cold snaps. If your car isn't on this chart, your dealer has a chart showing all cars; and amounts needed for temperatures to 60° below zero.

Find your car and read from left to right. The first figure shows the protection you get with one gallon of "Eveready Prestone" anti-freeze in the cooling system; the second with one and a half gallons—and so on. "+" means above zero. "—" means below zero. If your car has a hot water heater, add ¼ gallon to the quantity called for.

MODEL	1 GAL.	1½ GAL.	2 GAL.	2½ GAL.
Auburn				
6-52, '34; 6-53, '35; 6-54, '36	+12	−4	−27	−59
8-100, '32; 8-101, 8-105, '33	+15	+2	−16	−42
850, '34; 851, '35; 852, '36	+17	+6	−9	−28
Buick				
40, '34, '35, '36	+6	−18	−54	
60, '32; 50, '33, '34, '35	+10	−8	−34	−62
60, 80, 90, '36	+12	−4	−27	−59
80, 90, '32; 60, '33, '34, '35	+15	+2	−16	−42
80, 90, '33; 90, '34, '35	+19	+9	−3	−19
Cadillac				
370-D, '34, '35	+14	0	−21	−50
355-D, '34, '35; 80, 85, '36	+16	+4	−12	−34
452-D, '34, '35; 90, '36	+19	+9	−3	−19
370-A, '31; 355-B, '32; 355-C, '33	+21	+13	+3	−9
60, 70, 75, '36	+22	+15	+8	0
Chevrolet				
Stand.; '33, '34, '35	−12	−62		
Master; '33, '34, '35	−5	−47		
'31, '32	0	−34	−62	
All Models—'36	+8	−12	−43	
Chrysler				
6-'32, '33, '34, '35	+12	−4	−27	−59
8-'31, '32; AF, Imp. '35; 6-'36	+15	+2	−16	−42
Roy. 8, Imp. 8, '33; Air 8, '35	+16	+4	−12	−34
70, '31; DeLuxe 8, '36	+18	+8	−6	−23
De Soto				
6, '31, '32, '33; 8, '31	+10	−8	−34	−62
6, '34; Airflow 6, Airstream 6, '36	+16	+4	−12	−34
Airflow, Airstream, '35	+12	−4	−27	−59
Dodge				
6, '32, '33, '34, D2, '36	+8	−12	−43	
Senior 6, '30; DU, '35	+12	−4	−27	−59
8-'32, '33	+15	+2	−16	−42
Ford				
A, '30, '31; B, '32, '33	0	−34	−62	
V-8, '32, '33, '34, '36	+18	+8	−6	−23
V-8, '35	+16	+4	−12	−34
Graham				
80, 90, 110, '36	+10	−8	−34	−62
73-Spl. 6; 72-8, '35	+14	0	−21	−50
74-6, '35; 80, '36	0	−34	−62	
6, 8, '33; 6, 8, '34; 75, '35	+16	+4	−12	−34
Hudson				
6, '36	+3	−25	−62	
8, '31, '32, '33; 6, '35	+12	−4	−27	−59
8, '35, '36	+17	+6	−9	−28
8, '34	+19	+9	−3	−19
Hupmobile				
18, '31; Cent. 8, '32; 321, '33	+10	−8	−34	−62
417, 421, '34; 521, '35	+10	−8	−34	−62
322, '33; 422, '34; 518, '35;	+17	+6	−9	−28
6-618-G '36	+17	+6	−9	−28
326, '33; 426, '34; 527, '35;	+19	+10	0	−15
8-621-N '36	+19	+10	0	−15
Lafayette				
'34; '35; '36	+15	+2	−16	−42
La Salle				
50 (Str. 8) '36	+10	−8	−34	−62
350, '34; 35-50, '35	+15	+2	−16	−42
345-B, '32; 345-C, '33	+21	+13	+3	−9
Lincoln				
Zephyr, '36	+21	+13	+4	−7
136, '33, '34, '35, '36; 145, '34, '35, '36	+23	+17	+10	−2
Nash				
60, 70, '31; 960, 970, '32	+3	−25	−62	
1130, 1070, 1170, '33; 1220, '34	+12	−4	−27	−59
3620, 3640, 3640A, '36	+14	0	−21	−50
1280, '34; 3580, '35; 1080, 1180, '33	+17	+6	−9	−28
Oldsmobile				
F-30, '30; F-31, '31; F-35, '35;	+3	−25	−62	
F-36, '36	+3	−25	−62	
F-32, L-32, '32; F-33, '33;	+12	−4	−27	−59
L-35, '35; L-36, '36	+12	−4	−27	−59
L-33, '33; L-34, '34	+15	+2	−16	−42
Packard				
120-'35, '36	+14	0	−21	−50
Sup. 8, '33; '34; 8, '33, '34, '35	+16	+4	−12	−34
Sup. 8, '35	+18	+8	−6	−23
745, '30; 845, '31; DeLuxe, '32	+21	+13	+3	−9
12, '33, '34, '35, '36	+25	+21	+10	+3
Pierce Arrow				
41, 42, 43, '31; 54, '32; 836-A, '34	+21	+13	+3	−9
1601-8, '36	+21	+13	+3	−9
840-A, '34; 845, '35	+22	+15	+6	−5
1602-03 (12), '36	+24	+20	+15	+9
Plymouth				
'30; PF, PG, '34	+6	−18	−54	
PA, '31; PB, '32; PE, '34; PJ, '35;	+10	−8	−34	−62
P1, P2, '36	+10	−8	−34	−62
PC, PD, '33	+3	−25	−62	
Pontiac				
'30; '31; 6-'32; '35	+6	−18	−54	
8-'33, '34; '35; 6-'36	+8	−12	−43	
8-'36	+12	−4	−27	−59
Reo				
6-21, 6-25, '32; FC '35; Roy. '35;	+15	+2	−16	−42
6D, '36	+15	+2	−16	−42
8-25, '32; S-2, '33; S-6, '34	+16	+4	−12	−34
Studebaker				
Dict. 6, '36	+6	−18	−54	
Comm. 8, '31, '32, '33;	+10	−8	−34	−62
Dict. 6, '34, '35	+10	−8	−34	−62
Dict. '34, Comm. 8, '34,	+14	0	−21	−50
Pres. 8, '33, '34, '36	+14	0	−21	−50
Pres. 8, '31, '32, '35; Comm. 8, '35	+17	+6	−9	−28
Terraplane				
6, '32, '33; 6 Spec. '35; 6, '36	+3	−25	−62	
8, '33; 6 DeLuxe, '35	+10	−8	−34	−62
6, '34	+14	0	−21	−50

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. . .

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specifically
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TRAPPING ENEMY SPIES

by THOMAS M. JOHNSON

Author of "Our Secret War" and "Without Censor"

The *Idaho* and *Texas*, shown here, and all other U. S. warships have been closely guarded since the arrest last summer of two former Navy men on espionage charges.

"A SPY simply *must* communicate with his master," the foremost American hunter of spies told me. Then he added, fervently: "Thank God!"

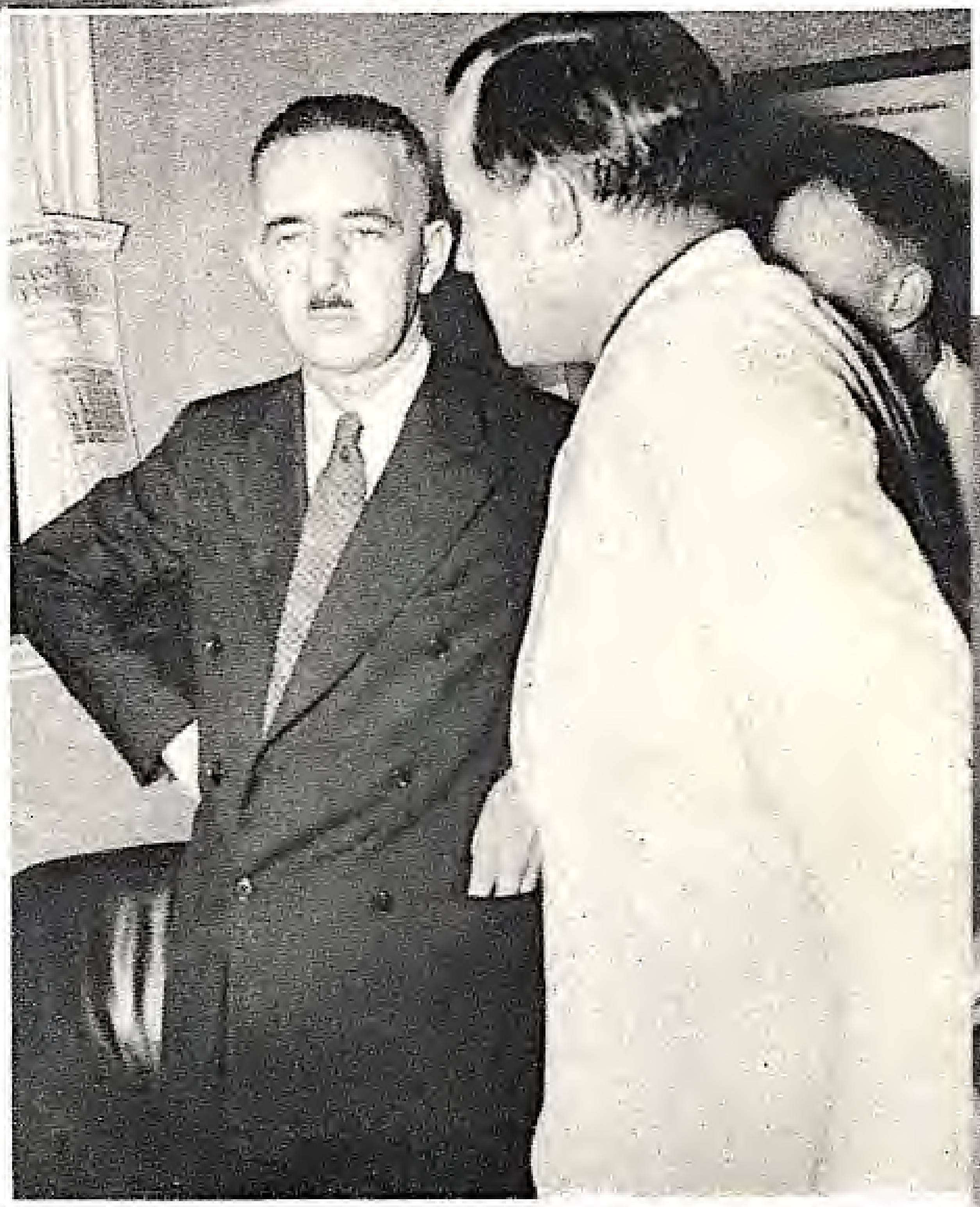
For the very act of sending his precious stolen information to the country he serves, places the war time spy in deadly danger. The "spy wireless" by which he sends it, is his strength only if it be safely hidden; once discovered, it is his weakness, betraying him to death at dawn before a firing squad. Through that fatal weakness, American spy hunters recently have detected an astounding number of spies for foreign countries, here among us, stealing our defense secrets.

Late this summer, the famous G-men of the Department of Justice startled a nation that usually thinks spies a good joke, by announcing that prowlers from overseas were so active they must be rounded up. Other government departments are taking precautions unprecedented in peace time. Nevertheless, Navy safes and confidential papers have been tampered with by eavesdroppers seeking information about our new billion dollar defense program, and they have stolen so much valuable information that Admiral W. H. Standley admits the Navy may change its fleet tactics.

It is not sensational but true that today there is more spying the world over, including our unsuspecting country, than in any period of so-called peace in history. In Europe alone spies great and small number hundreds of thousands, and the number arrested has trebled this past year. The world is preparing for war, arming; its powers sizing one another up, trying to steal war plans and inventions such as Yankee ingenuity has produced in such numbers. Foreign agents haunt Washington, seeking patent papers. But there is more.

For selling secrets to Japan, a former American navy petty officer was sentenced recently, to 15 years imprisonment, and a former lieutenant commander awaits trial as this is written. There have been other recent amazing spy cases. In each, has appeared the "spy wireless," unknown to science, yet sometimes, scientific, whereby the spy smuggles the papers containing vital information purloined from a government office, a battleship, even a locked safe, to the master spy who is not infrequently an official of a madly ambitious foreign power. Actually, "spy wireless" may be a hidden radio, an encoded telegram or a letter in secret ink, a carrier pigeon, a double-bottomed trunk, a book binding, the hollow barrel of a key—anything to conceal a tiny roll of tissue paper with its microscopic writing. In international secret service, the art of safe communication has been refined into a fascinating black art.

Arrested last July was Lieutenant Commander John S. Farnsworth, called "Dodo" at



John S. Farnsworth, a former lieutenant commander, shown as he was arraigned in Washington on charges of furnishing U. S. Navy secrets to Japan. He pleaded not guilty.

William F. Friedman, at left, former U. S. Army major, is one of the world's greatest solvers of spy codes and ciphers. Climax of a World War spy drama is pictured just above. Carl Hans Lody, the great German spy, salutes as a British court-martial condemns him to be shot in the Tower of London. A statue in his honor was unveiled in Lubeck, Germany; a bell above it is tolled every Nov. 6, anniversary of his death. Lody once lived in Omaha, Neb.

Mata Hari, at left, was the most glamorous of World War secret agents. An attractive dancer, she beguiled the highest officers until trapped and shot by the French. Her adventures have been the theme of books and motion pictures.

Spy-hunting American officers are pictured below in the special chemical laboratory of the Base Censor at Paris testing for secret ink a suspicious letter in the A. E. F. mail.

Annapolis, where he was graduated with honors. In naval aviation he went high, but crashed; his family says the accident left him "queer." Soon afterward, in 1927, he was dishonorably discharged from the navy. Needing money, he was charged with selling out as a spy to the Japanese, who in four years were alleged to have paid him $23,000, and using friendships with navy officers and wives to gather and give the Japanese "inside stuff" heard over bar and bridge table or, sometimes, lifted from desk drawers. Once it is said he boarded a destroyer, pretended to be a commander, and tricked an awed ensign into lending him maneuver data which he hurriedly photostated, then returned. But a new Japanese attaché cut his pay. Desperate, Farnsworth is said to have offered his confessions to an American newspaper for $20,000, and a 72-hour start for Europe aboard the Zeppelin Hindenburg. But Farnsworth confessed none of this; only to newspaper men he said that he sold the Japanese two "harmless monographs" for $1,000.

The "thirty pieces of silver" for which Harry T. Thompson betrayed his country, were $700. Yet his stealthy attack weakened the great United States Fleet, riding majestically at anchor in the Pacific, guns pointed toward the rising sun. A former navy yeoman, Thompson donned his old uniform, visited naval vessels, asked questions and brought back papers describing Pacific Fleet training. He camouflaged these as harmless brown-paper packages and delivered them to his master, also a Japanese naval officer. Their correspondence, also camouflaged, was read in court. But a letter can be opened, without leaving a trace, by slipping beneath the envelope flap, a stick with a slot in which the letter is caught and drawn out by gently winding the stick, read, and returned. On July 3 Thompson was convicted. In Los Angeles jail, common felons scorned the traitor spy.

Harry Thomas Thompson, left, a former Navy yeoman was convicted last summer, of espionage. Innocent persons are often arrested by spy-fearing authorities. Miss Isobel Lillian Steele, right, an American violinist, was freed after four months in a German prison camp.

This Japanese girl, Janet Ono, was a stammering and reluctant witness against Harry Thomas Thompson at his trial, in Los Angeles. Prosecutors contended that he used her as a means of contact with a Japanese consular attache.

In nearby San Pedro, two weeks later, came a visitor to the U. S. S. *Saratoga*. Aircraft carrier secrets are closely guarded since a foreign power obtained movies of one of them. When the stranger began asking questions and taking hurried notes, a dozen gobs sprang upon him.

"Why, these notes are in code!" they cried, angrily.

The code-writer went behind bars; final disposition of his case is shrouded in mystery.

So is the whole necromancy of codes and ciphers, the side of secret service that to the average reader, seems most occult of all. He little dreams that in these days of "peace," just as in war, the hidden struggle goes on between spy and spy-hunter, between code-writer, or cryptographer, and code-reader, or cryptanalyst.

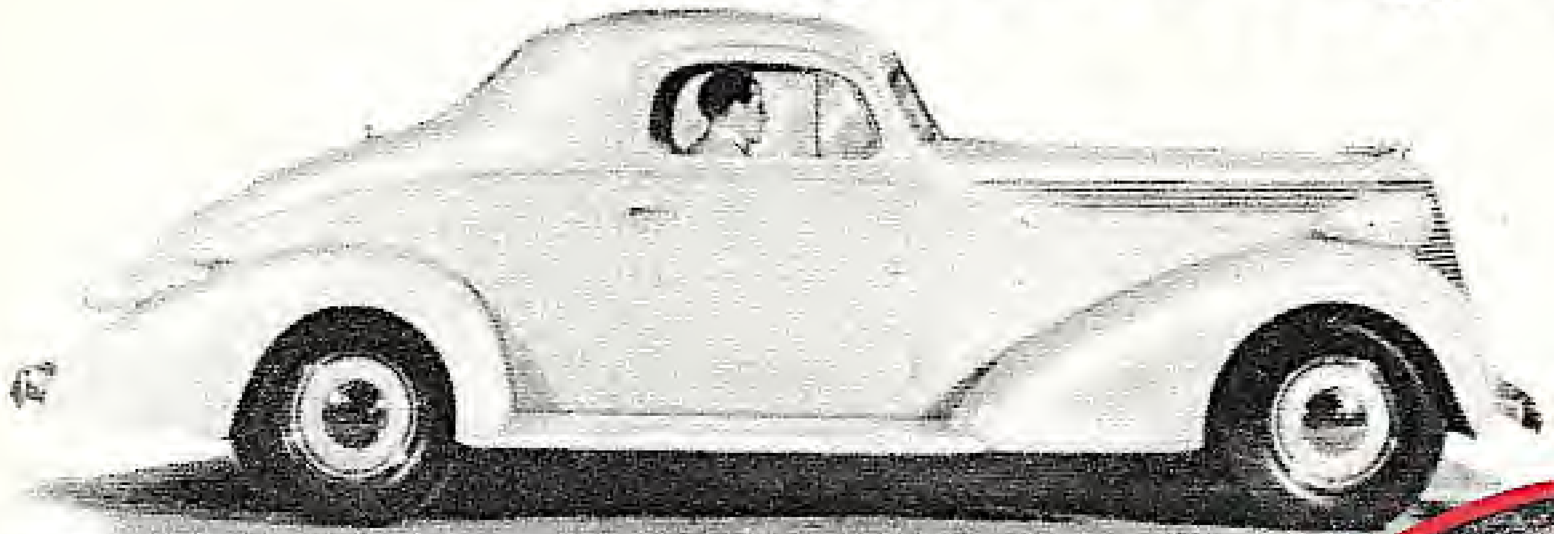
The spy hunter may tap his suspect's telephone, watch his mail and telegrams (which is almost universal in many foreign countries) —but that is only a beginning. You must watch everything—even his laundry! How can a dirty shirt hide a secret message? Well, suppose the shirt has 26 pleats, and spots scattered over the pleats—yes, in a pattern spelling words. Ridiculous? It's been done! And once you know the spy's laundry is his post office, the laundryman a confederate, then through that laundry you may send falsified reports to the master spy behind the scenes, and perhaps ultimately, unravel a whole spy network . . . thanks to spy wireless.

In Washington, in an inconspicuous wing of an unimpressive building, is a remarkable

[*Continued on page* 140]

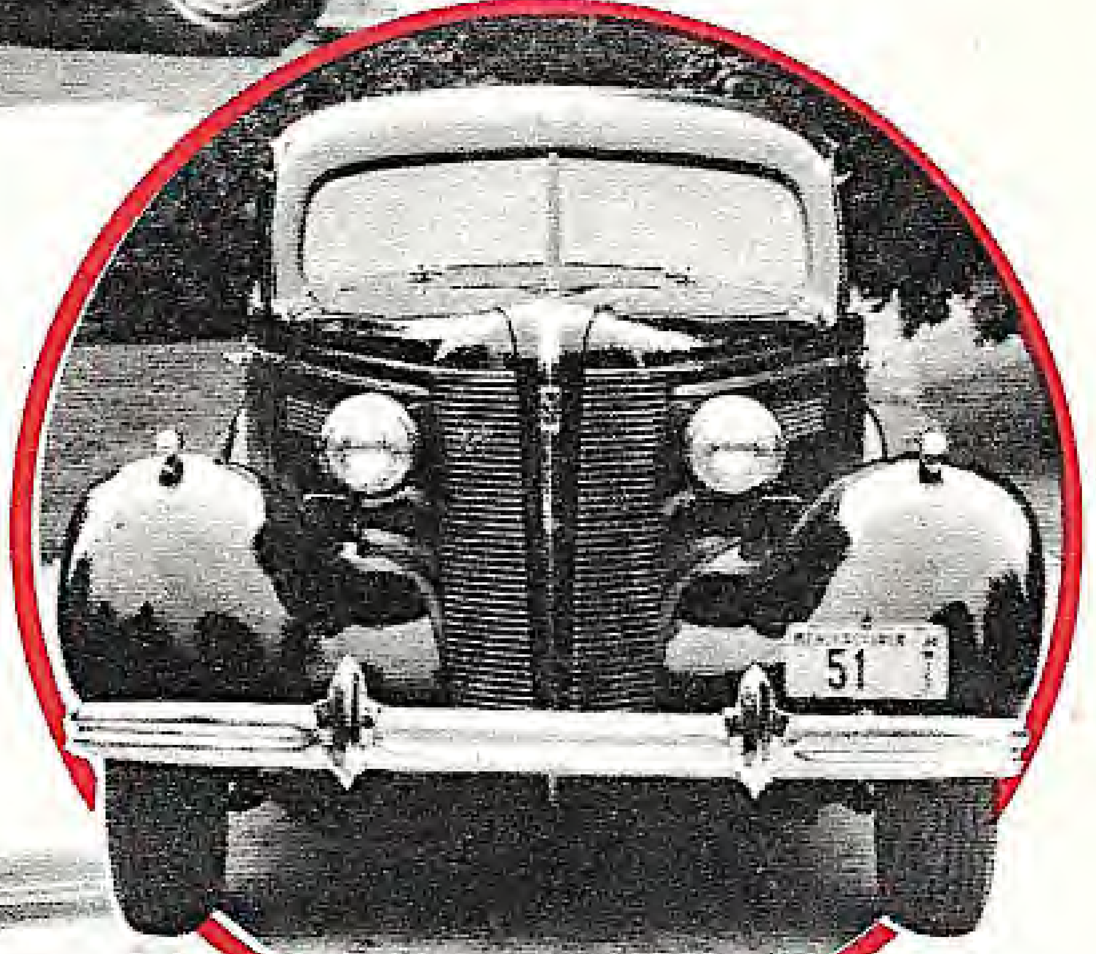
Engineering Features of 1937 Auto Marvels

by
JAMES
DYSON



Cars for 1937 are longer and lower as the new Studebaker coupe above illustrates. Seats are wider and interiors generally roomier than in the past.

Alfred Reeves, vice president of the Automobile Manufacturers' Association, is manager of the National Automobile Show in New York.



Front appearance of the new Buick is revealed above. Fenders, lights and radiator have been redesigned. New cars have greater luggage space than in the past. The 1937 Pontiac sedan at the left has space for a steamer trunk, two sets of golf clubs, a spare tire and other things.

AUTOMOBILES for 1937 attain new levels of safety, comfort and flexibility. Some models are little changed in outward appearance but all boast internal improvements of interest to the motorist. Many refinements hitherto found only in machines of high price are available for the first time in makes of the lowest cost.

Most models are longer and lower than the corresponding 1936 machines. Frames have been redesigned to support roomier bodies with wider seats. Hypoid rear axles permit floor dropping without a tunnel ridge. Seats can be adjusted not only forward and backward but up and down. On some models the back angle can be changed at will.

Though bigger, most machines weigh no more than formerly thanks to the continued development of fine alloys. Improved filters promise less oil consumption. Rubber poising, improved body insulation and better shock absorbers make for smoother riding than formerly.

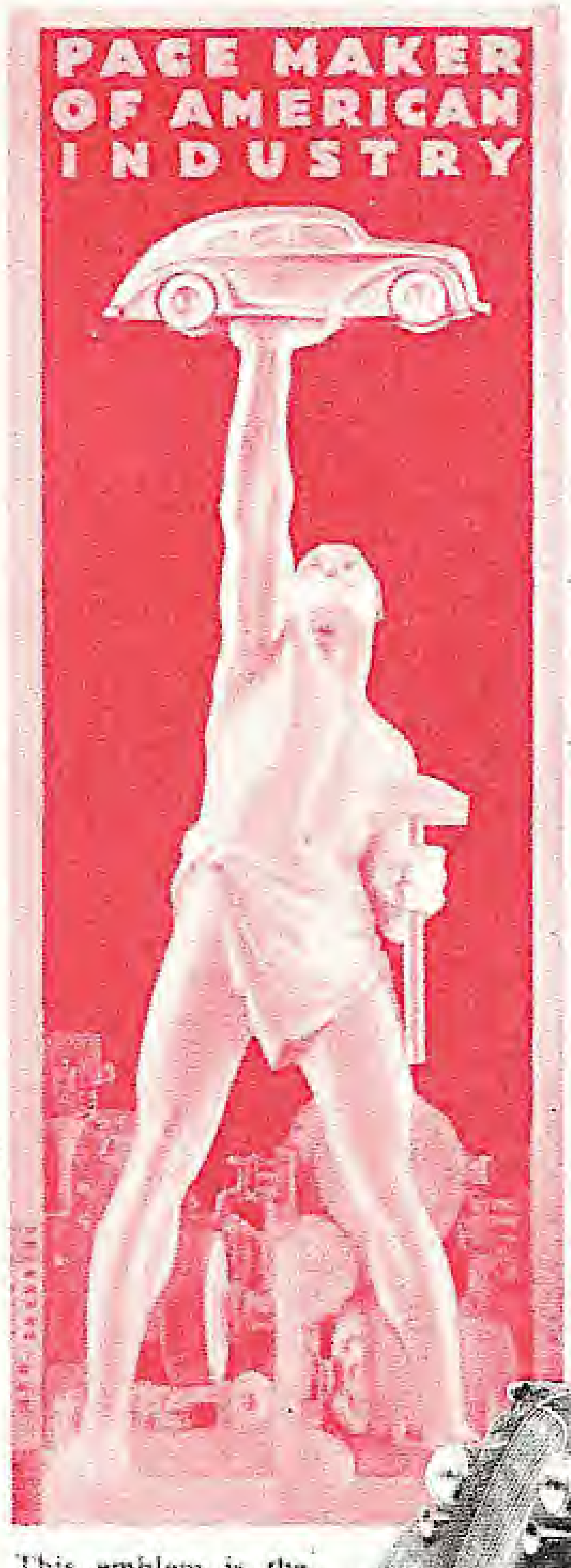
In accordance with accepted safety thought, many instrument panels have been revised to eliminate all projections. There are fewer sharp door handles.

Half a dozen manufacturers offer a new automatic defroster which releases a current of warm air from the car heater on both sides of the windshield.

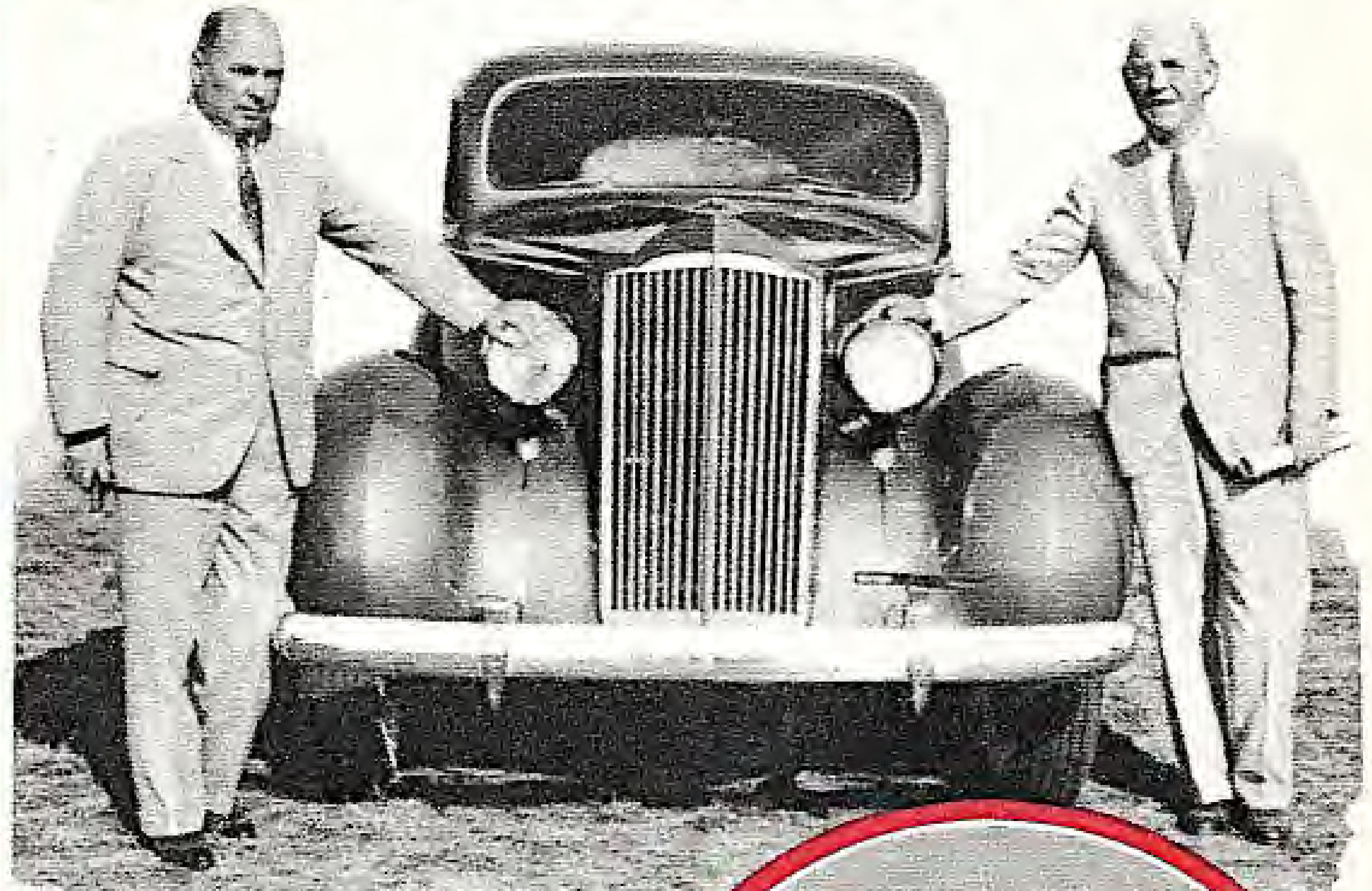
Body colors are brighter and upholstery more luxurious. Bright colored plastic substances appear in the fittings. Most machines have provision for radio sets. Batteries are larger and generators are arranged to take care of the increasing numbers of accessories requiring electricity.

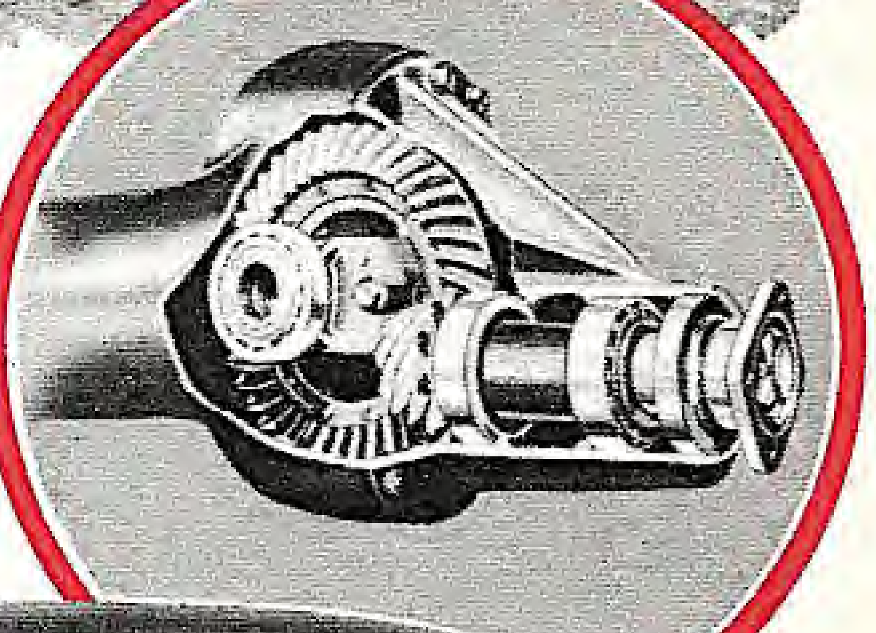
Chevrolet offers a new and improved steel body. Ford has an array of comfort and economy features but withheld announcement for the National Automobile Show opening in the Grand Central Palace in New York on Armistice Day.

Packard and Chrysler are offering new models in the lower priced fields. The former has a new "Six" and the latter the "Royal," also a six-cylinder machine. The Packard Six has a wheelbase of 115 inches and resembles the larger 120 which is con-

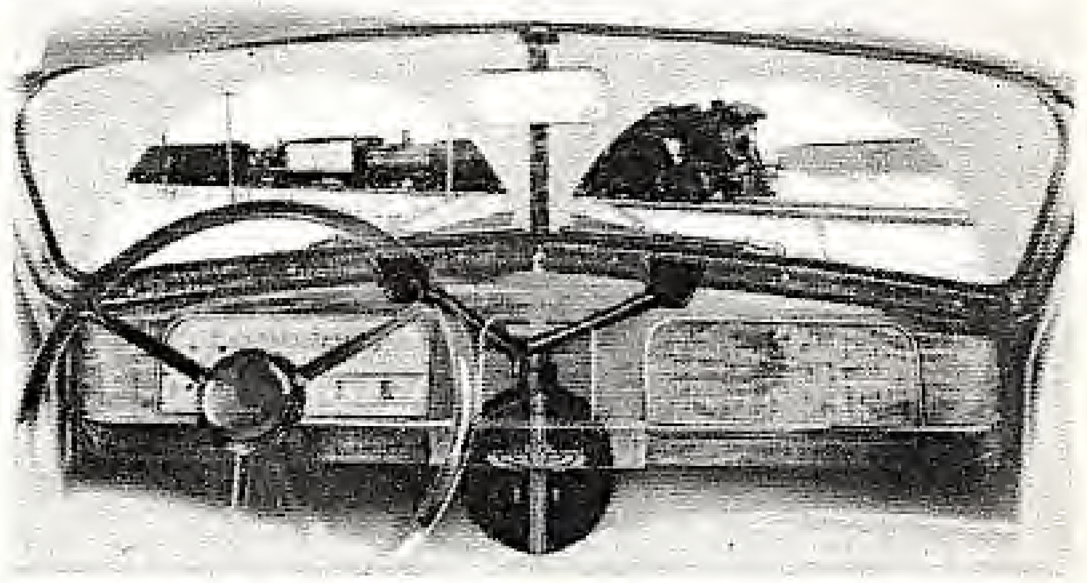


This emblem is the symbol of the National Automobile Show opening in New York on Armistice Day. Trailers will have space for the first time.





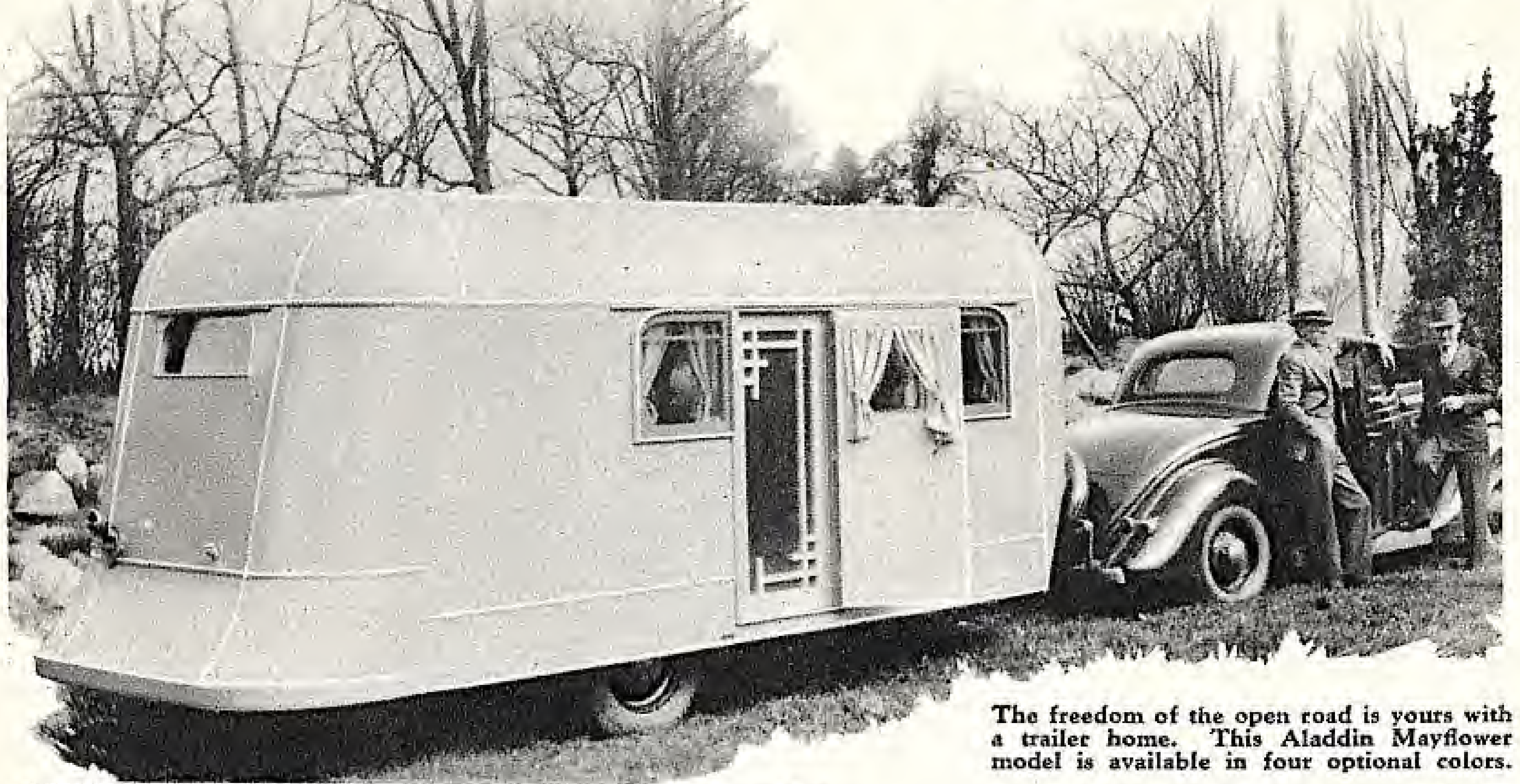
Packard's new six is shown above with M. M. Gilman, General Manager and Alvan Macauley, President. Several new cars feature hypoid rear axles. That of the new Chrysler Royal is shown at the right. The improvement permits lower cars. Automobiles with it include Pontiac, Plymouth, Studebaker.



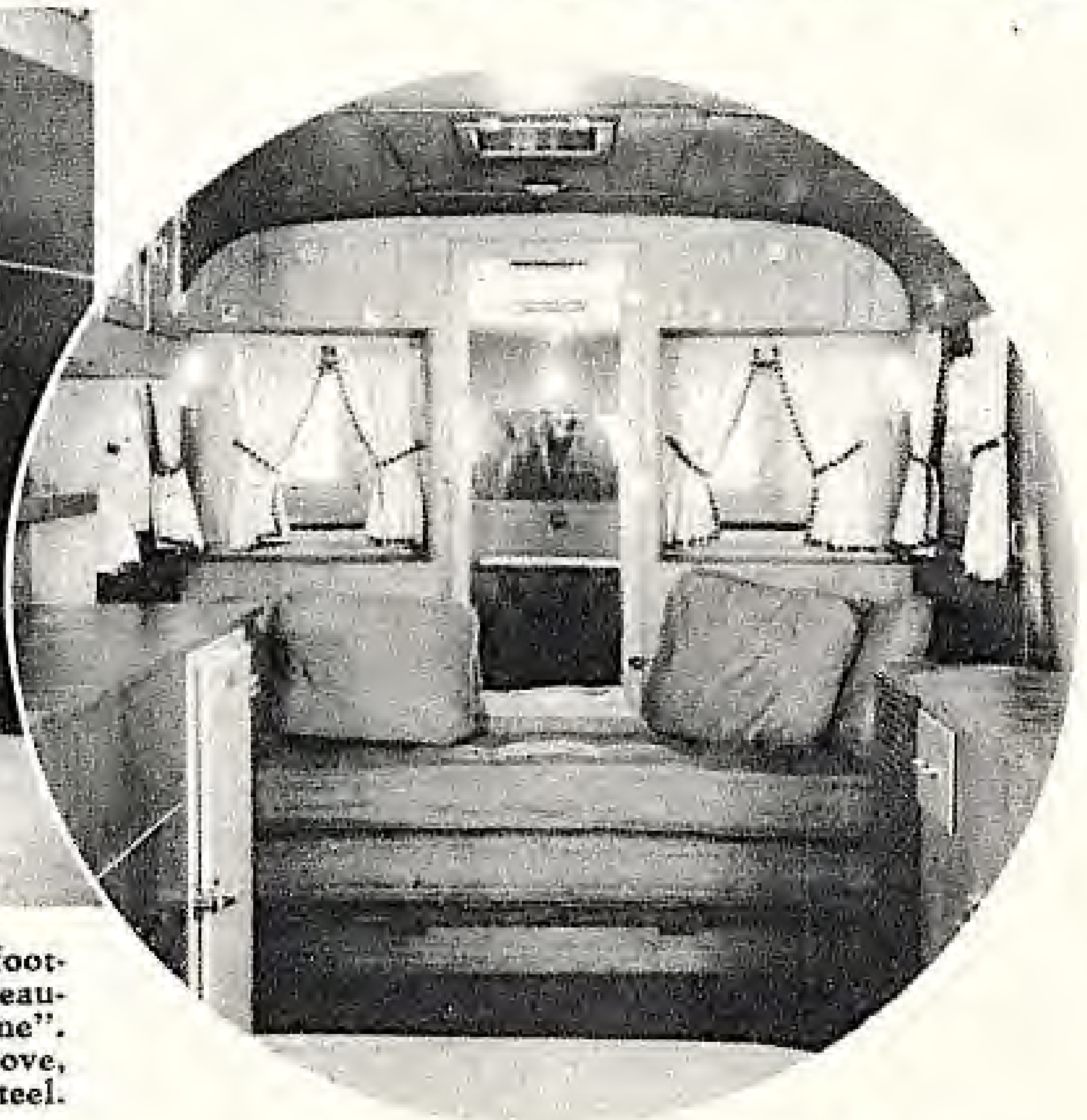
The sedan is a 120 Graham with supercharger. One of several new automatic windshield defrosters is pictured below. The one shown is that of Pontiac. The devices are expected to reduce the toll of winter accidents by improving visibility.

TRAILERS for NEXT YEAR

by
LOU FOLEY



The freedom of the open road is yours with a trailer home. This Aladdin Mayflower model is available in four optional colors.



Above—C. E. "Tiny" Thornhill, noted Stanford University football coach, and his wife are trailer enthusiasts. Circle—The beautiful mahogany finished interior of the Hayes "Motor-Home". Priced from $395 up, this trailer features an enclosed heating stove, refrigerator, and double folding couch. Body is welded steel.

ALONG with other distinctively automobile features, Mr. and Mrs. America are going to have plenty of steel in their 1937 traveling homes. The automobile makers have invaded the camp trailer field and the new 1937 lines, shown at the national automobile shows and elsewhere, reflect the influence of experienced designers and engineers who plan scientifically and produce by precision methods on an enormous production scale.

Steel enters the trailer picture definitely as a material for chassis and frames. One automobile builder—Pierce-Arrow—is showing the first all-metal trailers with chassis and frame of steel and the body of aluminum.

Two other old line automotive companies, the Federal Motor Truck Company, Detroit, and the Hayes Body Corporation, Grand Rapids, Mich., have also brought out house trailer lines in which steel chassis construction and precision manufacturing are featured. At least two more well-known car makers are expected to enter the trailer field.

Steel chassis for the 1937 trailers are electrically welded so that they are, in effect, one piece. In the case of the Pierce-Arrow chassis all-steel channel and box section members are provided which are of welded construction. Chassis cross members, body sills, vertical pillars, horizontal bars, roof bows and longitudinal members are in themselves of U-beam type but all of them become box or tubular members when the outside paneling is riveted to them.

To meet the competition set by these new rivals, established trailer manufacturers are going to steel construction as rapidly as they can transform their plant facilities. Eleven out of 40 of the larger makers have already announced their switch to steel for their trailer chassis.

With the changes mentioned above, the camp trailer has advanced a long step forward

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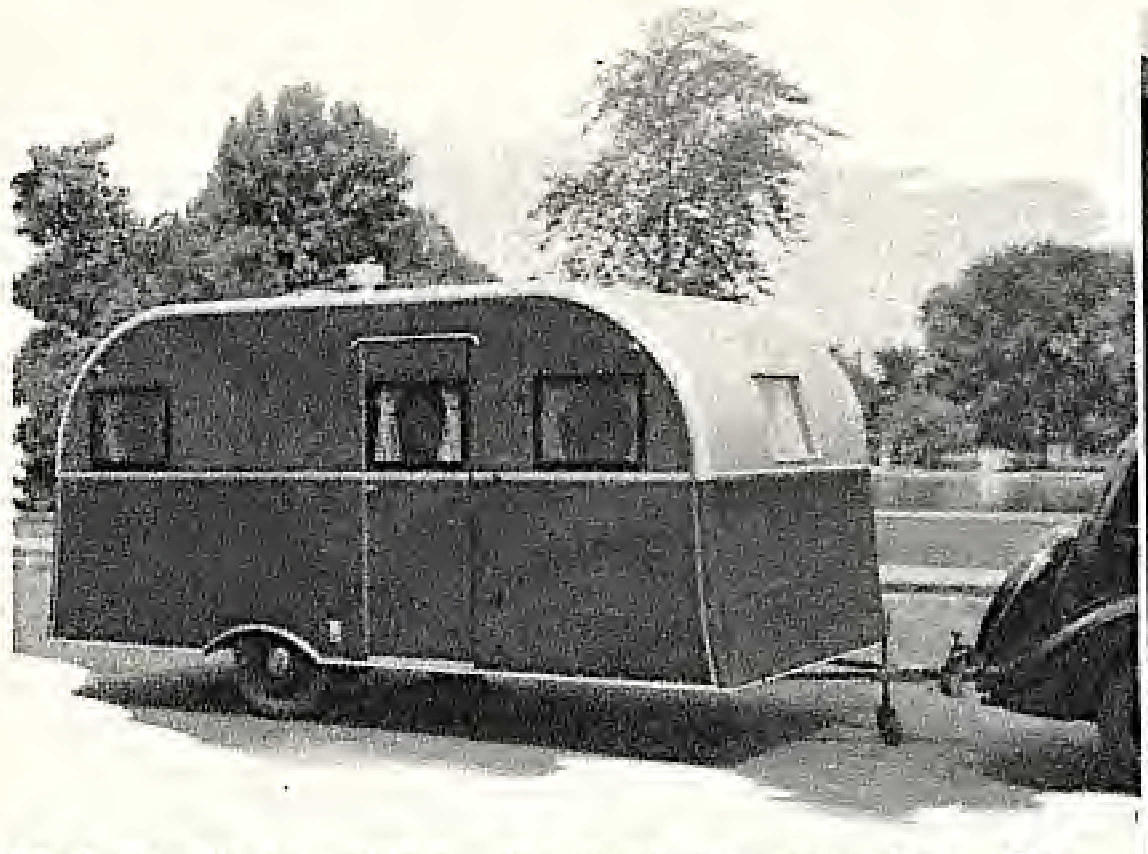
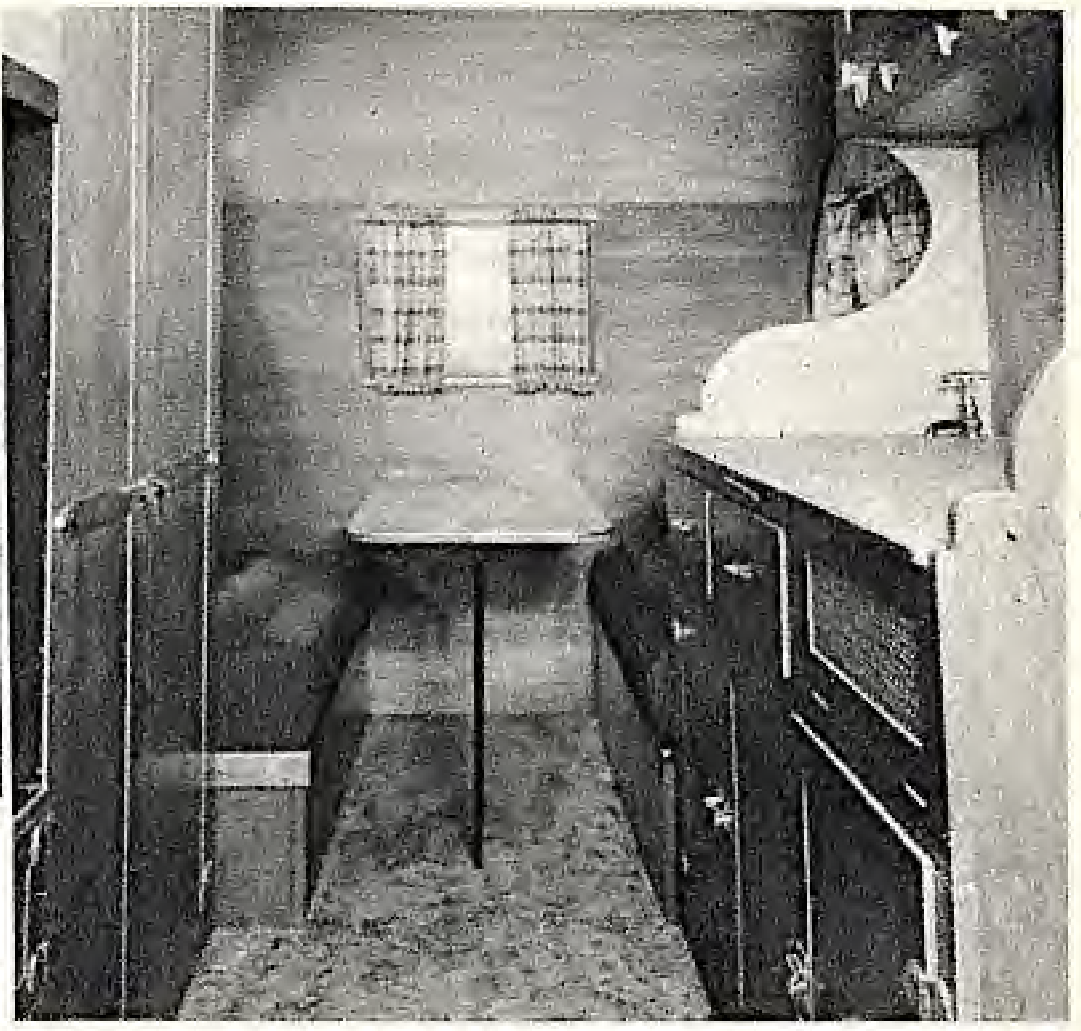
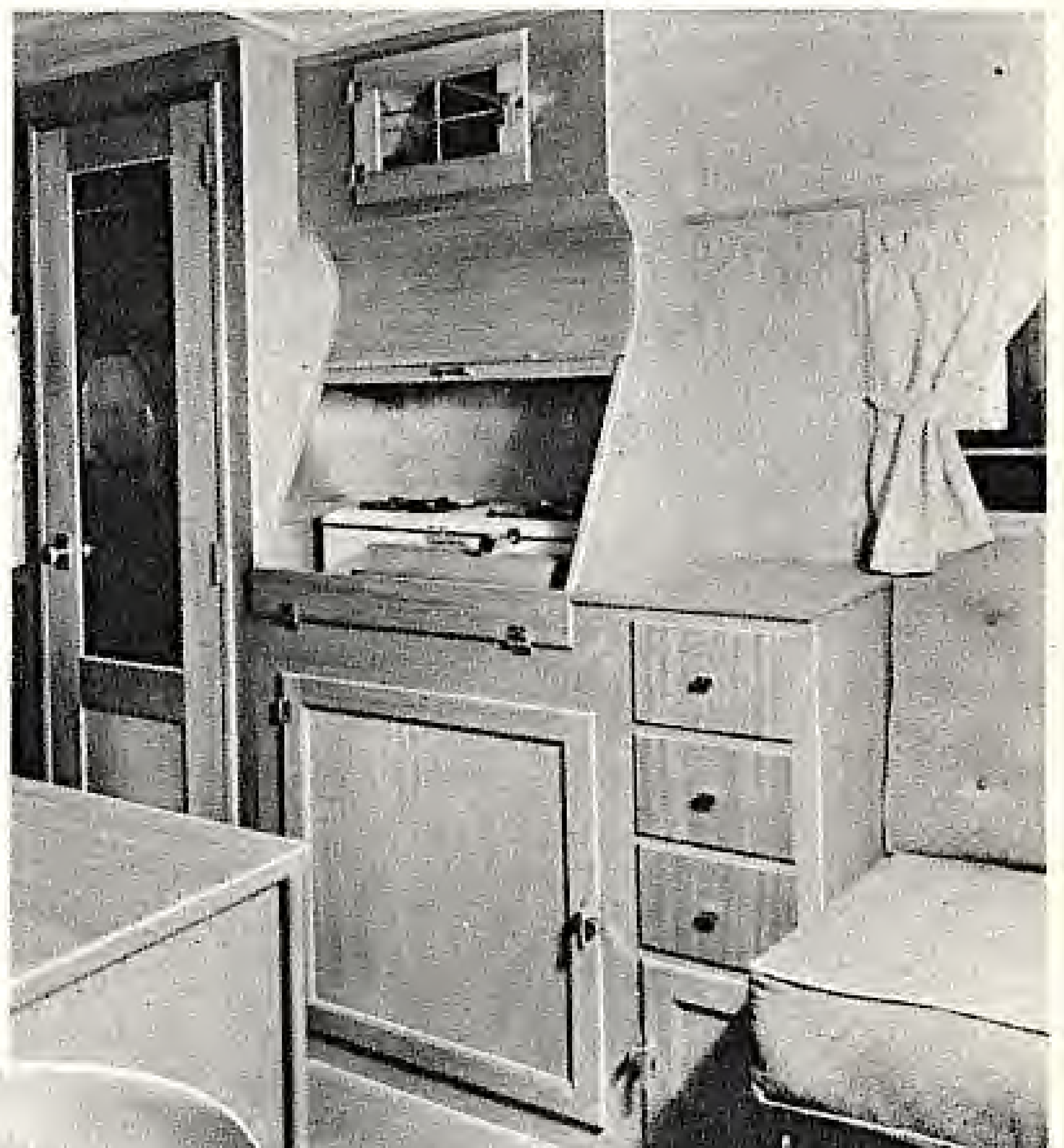
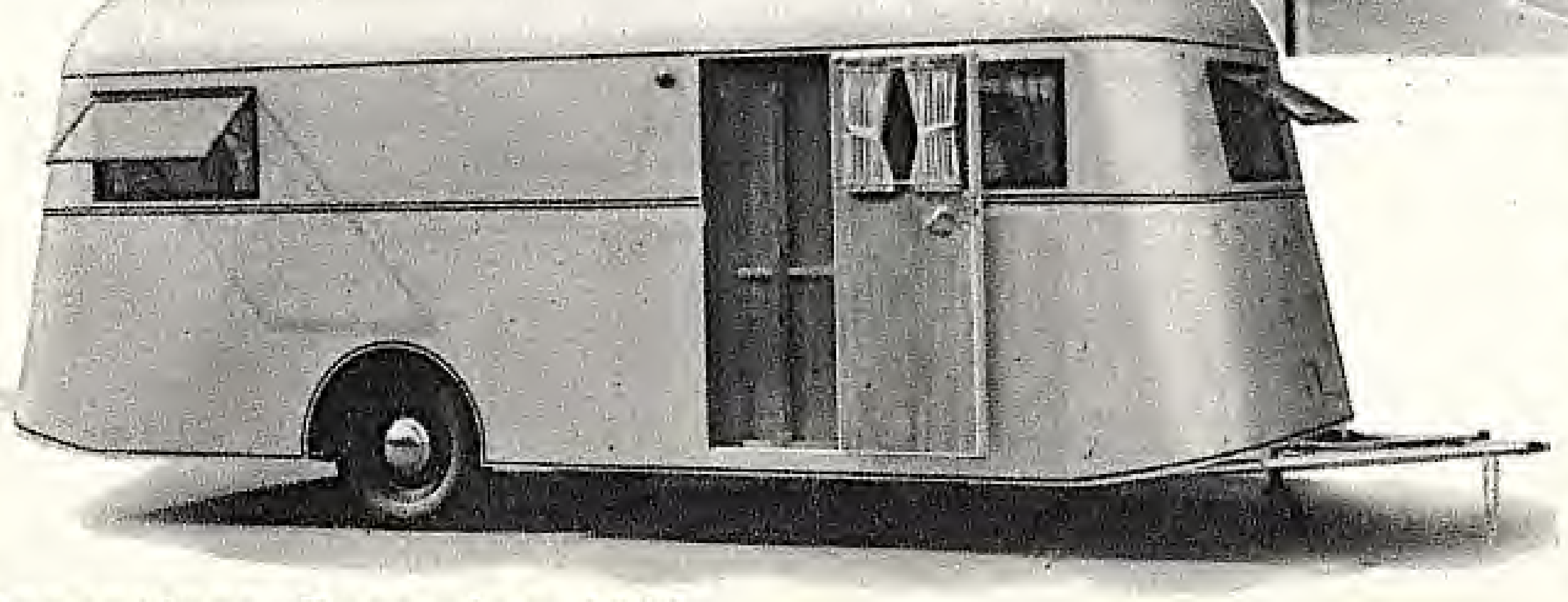


Modern trailers provide ample room for home comforts. This Federal Motohome contains 104½ square feet of floor space.



Interior view of the Motohome showing the Pullman type diner that accomodates four people. The seats are arranged at night to make a bed 50 inches wide. Note the large cupboards and drawers. Covered sink basin provides extra table.



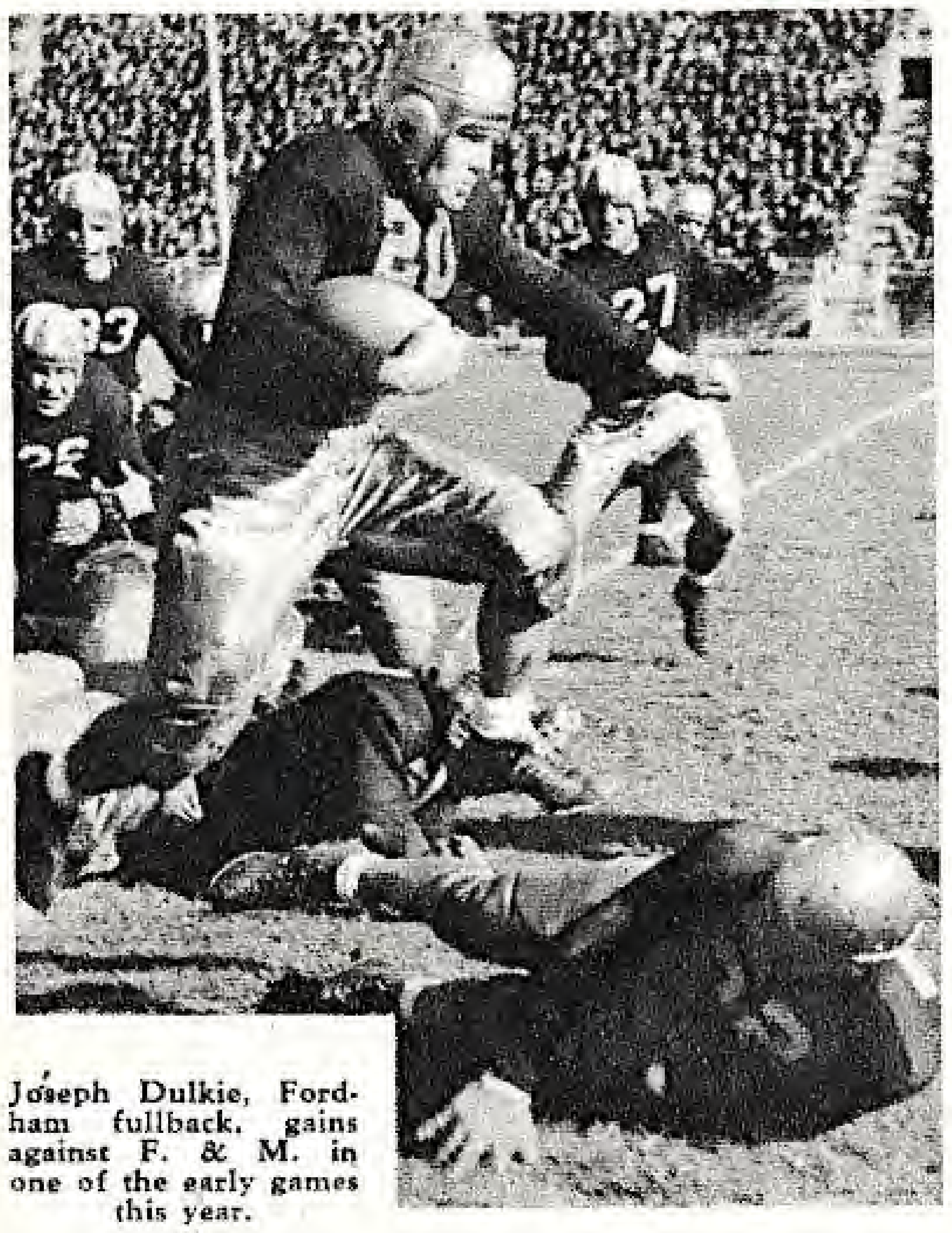


Left—The Pierce-Arrow Travelodge, said to be the first trailer built with an all-steel chassis and body frame plus a metal paneling body. Above—Travelodge interior. The two-burner cook stove, metal lined cabinets, drawers for silverware, refrigerator, inlaid linoleum work table, and other refinements appeal strongly to the critical feminine eye and mind.

WHAT *Becomes of* FOOTBALL STARS?

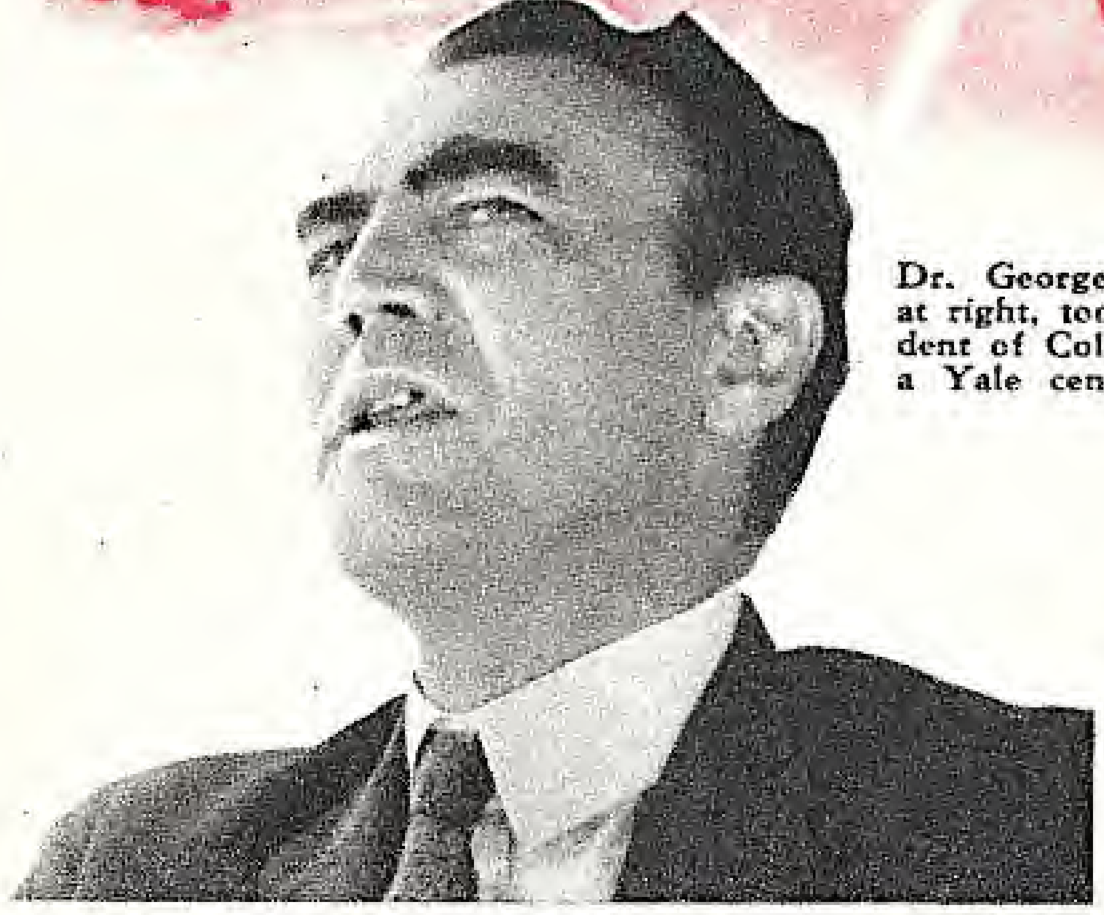
by **DANIEL**

New York World-Telegram Sports Writer

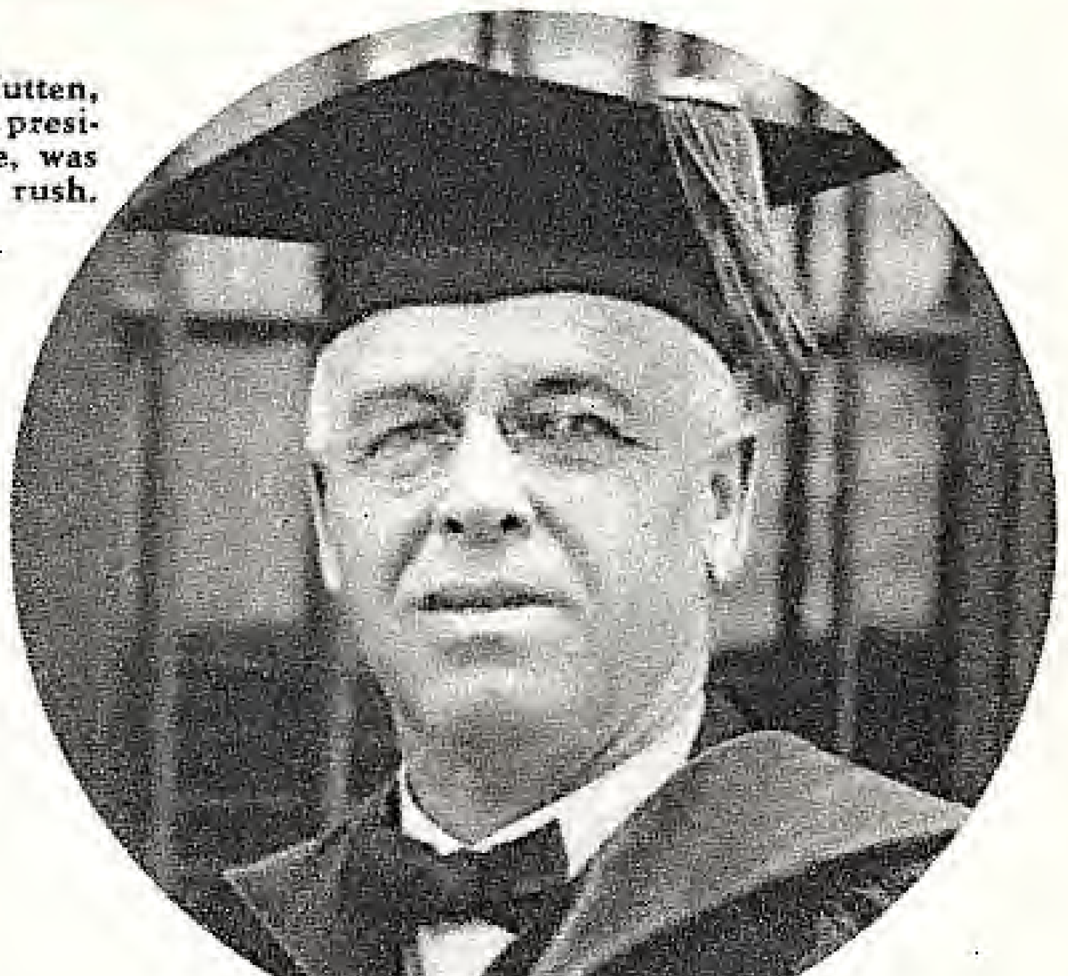


Joseph Dulkie, Fordham fullback, gains against F. & M. in one of the early games this year.

Col. John Reed Kilpatrick is a football player whose fame did not end with his graduation. A 1909 All-American end at Yale, he now directs Madison Square Garden, America's greatest indoor arena.



Representative Hamilton Fish, Jr., was one of Harvard's great linemen and captained the 1910 team. He ascribes much of his success to football.



Dr. George Cutten, at right, today president of Colgate, was a Yale center rush.

TO THE followers of college football constantly is being pointed out the ignoble failure in life of some of its stars. That these exceptions form only a small part of the memorabilia of the game is lost upon the critics. They do not know the tremendous number of leaders that football has given to American life. Football, the contest of brawn and brain, does breed manhood and character. As some old coach once said: "There are no knocks in life that frighten a man who has had to take it in football."

The three principal candidates for President this year are former football players. Franklin D. Roosevelt was a gangling lineman at Groton. Alf M. Landon played at Kansas. Though William Lemke weighed but 150 pounds in a day of giant players, he was guard and captain of the 1902 North Dakota eleven. All of the Roosevelt sons played at Groton and Landon gives up lots of Saturdays to watch Kansas.

They tell a yarn about Landon and William Hayward, former United States Attorney General in New York City, anent the former's football interest. The two met on Landon's campaign train and began to talk football.

Their discussion ranged all over the country but inevitably it returned to the rivalry between Hayward's old school, Nebraska, for which he played half-back, and Kansas. Apparently the edge has rested with Nebraska because when Hayward asked Landon what his first move would be, if elected, Alf replied: "Call out the United States Army, Marine Corps and Navy and lick that damn Nebraska football team!"

Football's contacts are world-girdling. Henderson E. Van Surdam, secretary of the New York Touchdown Club, an organization of ex-college players who meet weekly during the season, describes an incident in Shanghai. Van Surdam at the time was introducing an American jazz band to the Orient.

Van Surdam, who was an all-New England quarterback at Wesleyan and later coached at four colleges, including Sewanee, suddenly came upon a familiar face while threading one of the narrow streets. "Remember me?" this person popped. The ex-coach hesitated.

"Yes," he blurted, " I know you. You are 'Chigger' Brown, my 125-pound back from Sewanee, team of 1908." Van Surdam was correct in every detail. The ex-lightweight told his story. He had come to the East some years before as a trader. Later he had become interested in the egg business, exporting millions to the United States and Canada. He was quite comfortably situated and happy to remain in Shanghai. Van Surdam's career is a distinctive and successful one. He has been all of seven characters: musician, football coach, official, writer, music composer, glee club leader and cruise director.

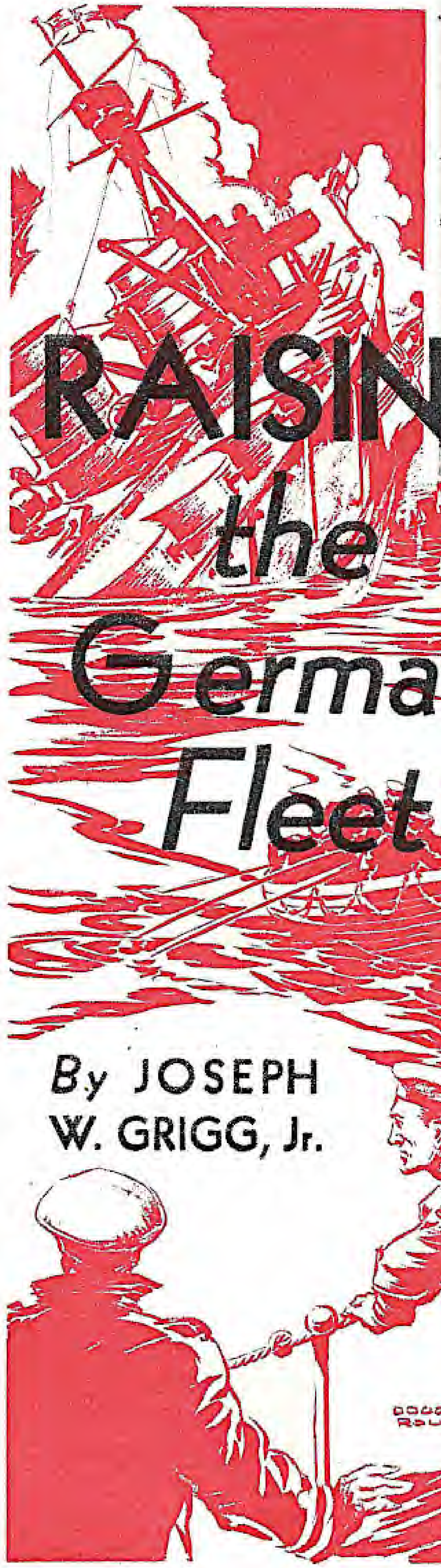
When "Viva Villa!" was being shouted south of the Rio Grande Van Surdam was conducting El Paso Military Institute at El Paso, Texas. Border troubles hit the enrollment so severely that he was compelled to close the school. Not long after he founded the Texas School of Mines. The original enrollment was 70. Today its student body totals 700. It plays football and has a worthy reputation.

Drop in to a meeting of the Touchdown Club and you'll realize the quality of sound, successful citizens developed by football.

You'll see Ed Garbisch, All-American center in 1924 who played eight brilliant years of college football, four at Washington and Jefferson and four at West Point. Garbisch, firm believer in the efficacy of prayer, led his teammates in devotion before major games and it worked. Garbisch today is vice president of an important advertising agency, J. Sterling Getchell, Inc.

Next probably you'll encounter Dr. Francis

The crew of the *Kaiser Frederich der Grosse* leaped into small boats. The great German flagship heeled over and sank! Ship after ship followed her. Encased in seaweed and slime, the *Hindenburg* is pictured at the right as she was raised above the surface.



RAISING the German Fleet

By JOSEPH W. GRIGG, Jr.

TOILING in the icy depths of Scapa Flow, the broad landlocked harbor in the Orkney Isles, north of Scotland, British engineers and divers today are enacting what probably will be hailed some day as the greatest salvaging epic in the history of the sea.

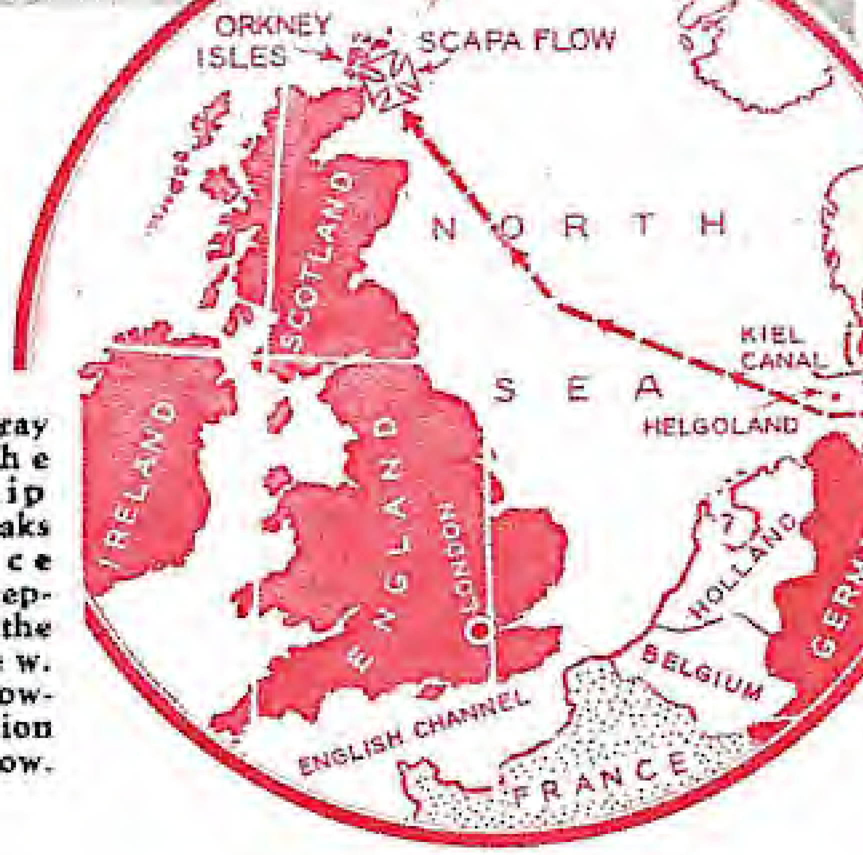
Though the world at large hears but little of their feats, they are dragging to the surface one by one of the giants of Germany's once proud High Seas Fleet, now battered rusted hulks, which have lain for 17 years fathoms-deep beneath the swirling waters of Scapa. The iron from some of those very ships is being used today by the modern Germany of Adolf Hitler in the great European armaments race.

To recall the first act of the drama of Scapa means going back to a sunny June morning in 1919 when line upon line of iron-gray German warships—some 74 all told—were swinging lazily at anchor in the harbor which had been Britain's chief naval base throughout the Great War. Kaiser Wilhelm's High Seas Fleet had been interned there since it was surrendered by Germany at the Armistice. Allied jealousy prevented the British receiving the ships and the German crews remained aboard.

That morning of June 21, the bulk of the British fleet was out at torpedo practice in the North Sea. Only a few drifters steamed up and down the German lines. Suddenly the crew of the *Kaiser Friedrich der Grosse* were seen leaping into small boats. Then before the astonished eyes of the British seamen the great German flagship heeled over and sank. Ship after ship followed her. An urgent radio message brought the British fleet scurrying back two hours later. All the British could do, however, was to beach a few of the German destroyers. The Germans had opened the valves and scuttled their fleet.

Out of 74 ships the great majority sank to the bottom of Scapa Flow that day. For 12 years now salvagers have ventured their lives to float them again. As one corroded giant after another is laboriously pumped and hauled from the ocean-bed, its bulky carcase is towed 250 miles to the ship-breaking yards at Rosyth or Rothesay, both in Scotland, for breaking up and sales as scrap-iron. Hundreds of tons of that iron have been bought by Germany in the past two years, to be melted down and recast into big guns, shells, tanks and new battleships. Hundreds of tons more are going into armor-plating for British warships and into building Britain's merchant fleet. Some of the same salvaged iron is fulfilling the more prosaic role of girders in palatial new movie-houses, blocks of new apartment-houses and hotels in London.

With ten of the largest ships still to be recovered the world's biggest salvaging job already has cost more than $3,000,000. The value of the ships so ruthlessly scuttled is estimated at close on a hundred times that figure. Yet the salvagers have barely, if at all, recouped themselves for the expenditure involved.



Sending spray skyward, the Battleship *Kaiserin* breaks the surface after long preparation by the salvage crew. A map showing the location of Scapa Flow.

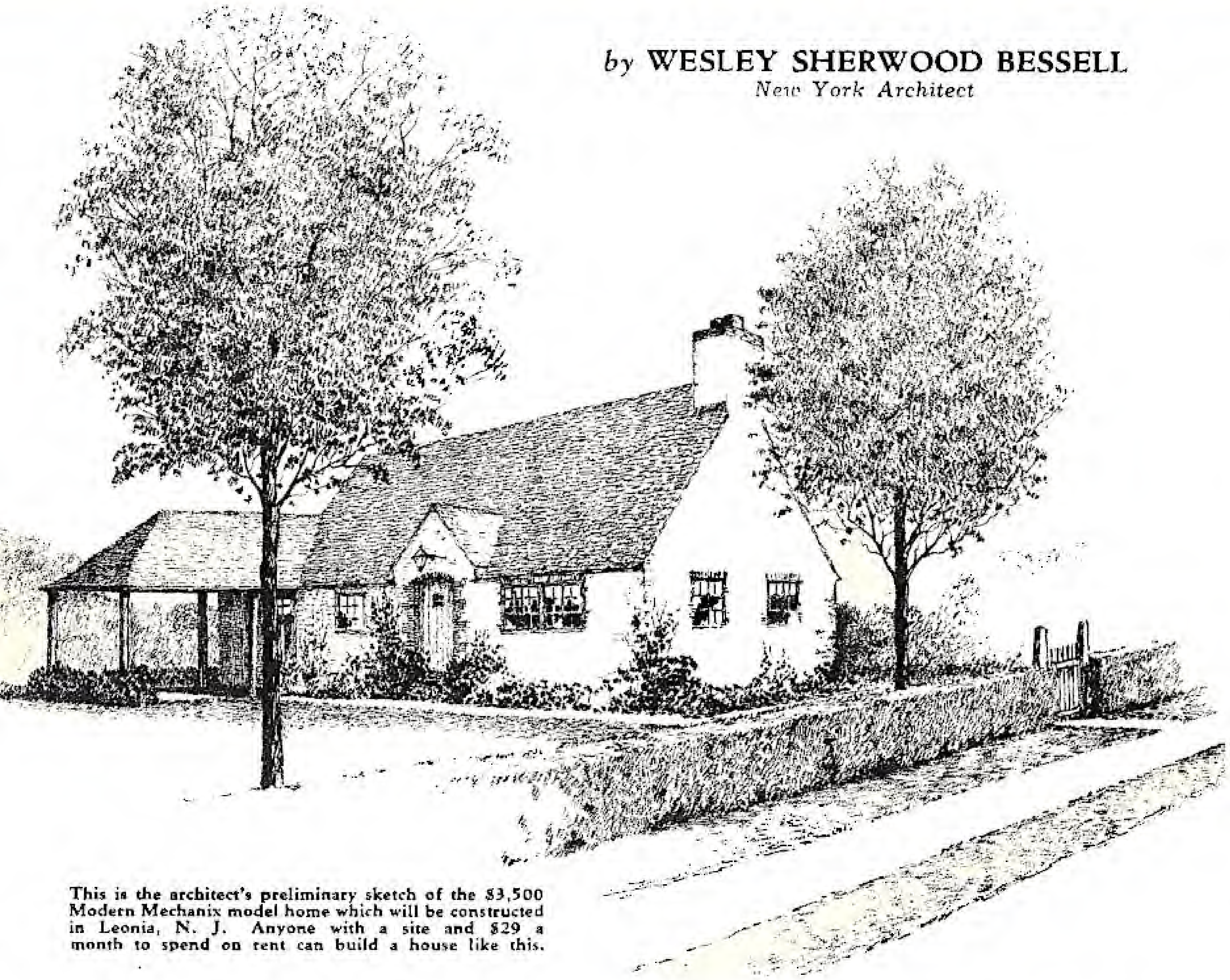
For more than five years the German High Seas Fleet lay rusting at the bottom of Scapa Flow. None even of the recognized salvaging experts was willing to risk the cost of trying to bring the warships to the surface again. Then one day early in 1924 a virtually unknown Londoner named E. F. Cox took a trip up to Scapa. At that time he was in his late thirties and managing director of the iron and steel merchanting firm of "Cox and Danks," of London. He had had no previous salvaging experience, but a friend had suggested to him that there was a mine of scrap iron rusting away beneath the waters of Scapa Flow, waiting for whoever was prepared to bring it up. Cox's imagination was fired and he spent several days surveying the wreckage. A few weeks later he had an Admiralty contract in his pocket for salvaging 25 German destroyers.

Cox immediately got together the best

FLOOR PLANS for MM MODEL Homes

by **WESLEY SHERWOOD BESSELL**
New York Architect

Careful Planning Provides Space for Present and Future Needs, Facilities for Play, Recreation and Entertainment Within Reach of Average Man.



This is the architect's preliminary sketch of the $3,500 Modern Mechanix model home which will be constructed in Leonia, N. J. Anyone with a site and $29 a month to spend on rent can build a house like this.

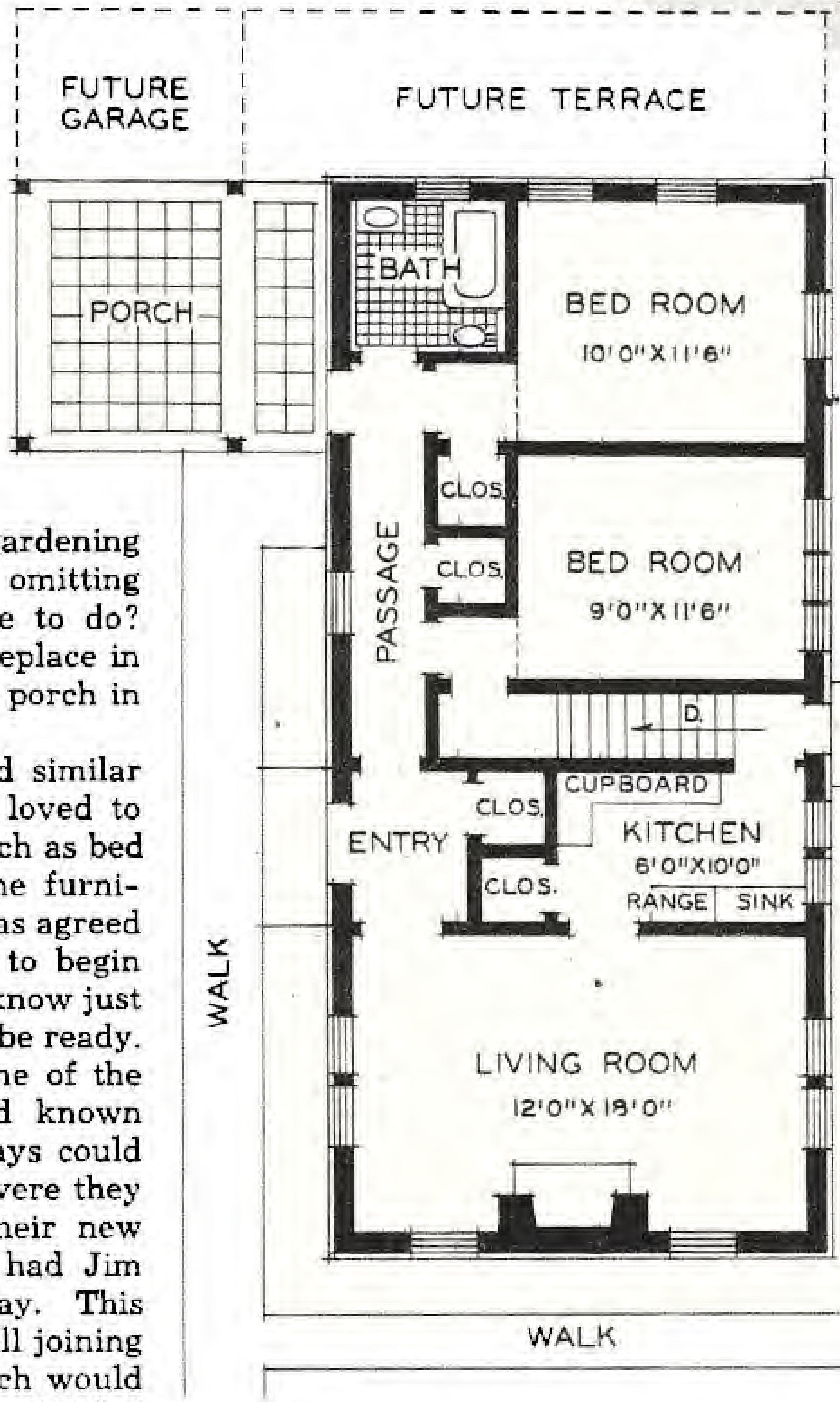
WITHIN the confines of a delightful little office library, surrounded by books on architecture, sat four people, Tom and his wife and Bill and his Boss. They were discussing the problem of a new home. From that day when they had purchased their lot in the country, Tom's wife had been cutting out all sorts of pictures from magazines that had to do with the home. There were interiors showing fireplaces, cupboards, kitchen cabinets, refrigerators, bathroom fixtures, pine panelled walls, furniture, designs of doorways, gardens and garden furniture, also wallpaper patterns. These lay about on the library table, as bit by bit Bill's Boss drew out Tom and his wife as to just what they desired.

Tom was interested in the heating system. He wanted an oil burner, if they could afford one; his wife was more concerned about the kitchen. Could she have one that would make that part of the housework easy, small and compact, with some of those lovely looking cabinets in color, and complete in one unit, such as she had seen illustrated in the magazines? After some time, Bill's Boss suggested that a home such as they would like could be well planned all on one floor. Tom's wife thought this idea would be just wonderful, as it would be easy to keep tidy and clean, and no up and down stairs to worry about. Tom thought it might be hot living directly under the roof, but was reassured, when told the space under the roof could be insulated as a protection against heat and cold. Tom's wife wanted to know if the space under the roof could be used for storage, and was pleased when told that it could, and that a disappearing stairway could be installed, and used only when necessary, that at other times it lifted up into the ceiling.

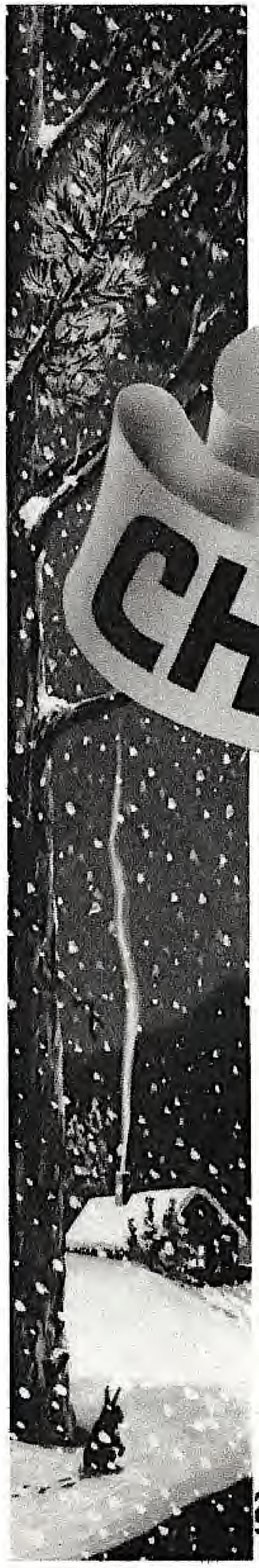
Both Tom and his wife were so excited about all the ideas advanced by Bill's Boss, simply because he seemed to read their every thought in planning for them the home they had dreamed would some day be their very own. Needless to say, he was only furthering their ideas in a more concrete and professional manner from the information they themselves had imparted to him, which, after all, was the result of his years of training and experience. He constantly jotted down notes, and asked questions as to their mode of living; did they play cards, like reading, did they entertain? They did play cards, and liked reading, but did not entertain so very much. Had they many friends, or relatives, that stayed over night with them? "No." What besides gardening and making garden furniture, not omitting amateur photography, did Tom like to do? "Sit and read in front of an open fireplace in the winter, or in a hammock on the porch in summer."

As for Tom's wife, well she liked similar things, including cooking; and she loved to make pretty things for her home, such as bed spreads, curtains, slip covers for the furniture, and lamp shades. Finally, it was agreed that Bill's Boss had sufficient data to begin his sketches, and he would let them know just as soon as possible when they would be ready. Tom and his wife departed after one of the most exciting two hours they had known since their wedding day, and for days could not contain themselves, so anxious were they to see the plans and picture of their new home. Wisely enough Bill's Boss had Jim and his wife come in on another day. This was done to avoid the confusion of all joining in the discussion as to just what each would like, and neither couple getting undivided attention.

Jim's and his wife's tastes were different



Floor plans for the $3,500 model home are arranged to permit possible later additions of a garage and terrace to the arrangements. The house contains two ample bedrooms.

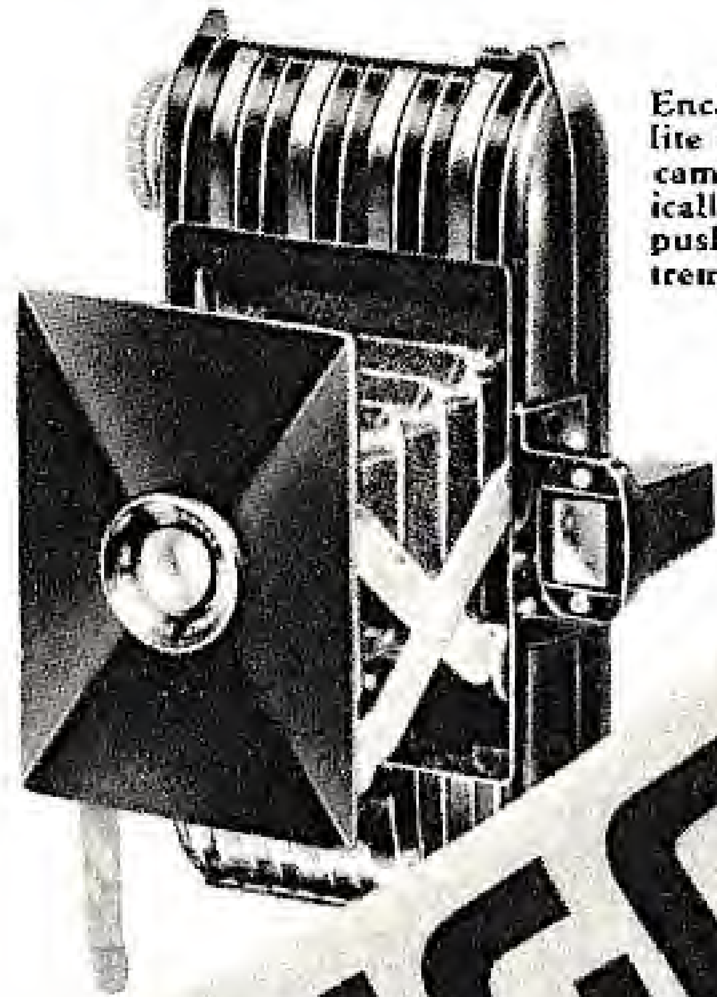


CHRISTMAS SUGGESTIONS

For the amateur scientist this Micro-photography outfit is the ideal gift. Permanent records of all experiments can be kept on photographic prints. The microscope and the camera can be used independently.

Cellulose wrappings add much to the appearance of gifts. At right are examples of what attractive wrapping will do. Below—This toy airplane will thrill any youth who receives it. Plane performs like a real ship.

LIONEL
AIRPORT
ST. PAUL
SEATTLE
SAN FRANCISCO
LOS ANGELES
NEW MEXICO
NEW ORLEANS
PHILADELPHIA
NEW YORK
N
E
S
W

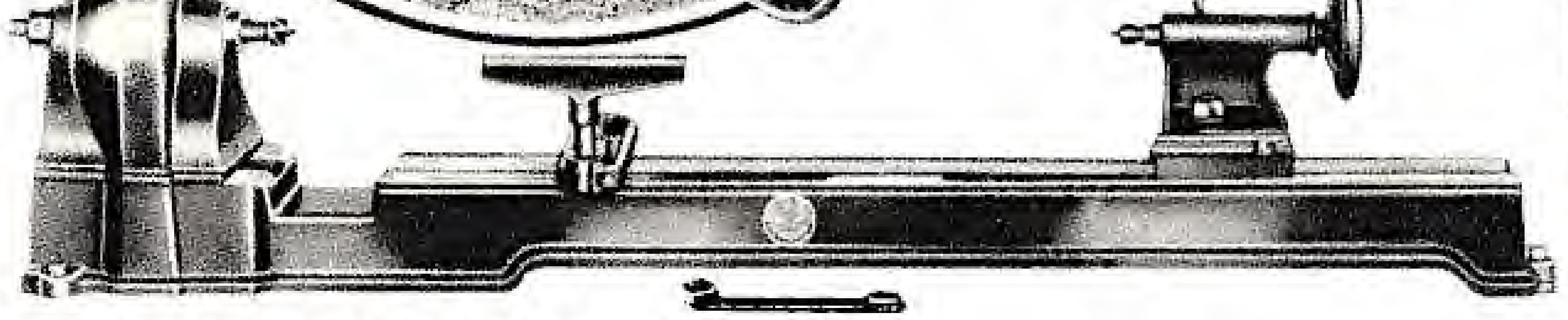


Encased in a neat bakelite case this handy purse camera opens automatically when a button is pushed. It takes extremely sharp pictures.

REMINGTON 5
TON RAND

A typewriter is the ideal gift for any member of the family. Here is one embodying all of the features found on a large machine yet small enough to carry about in a traveling case.

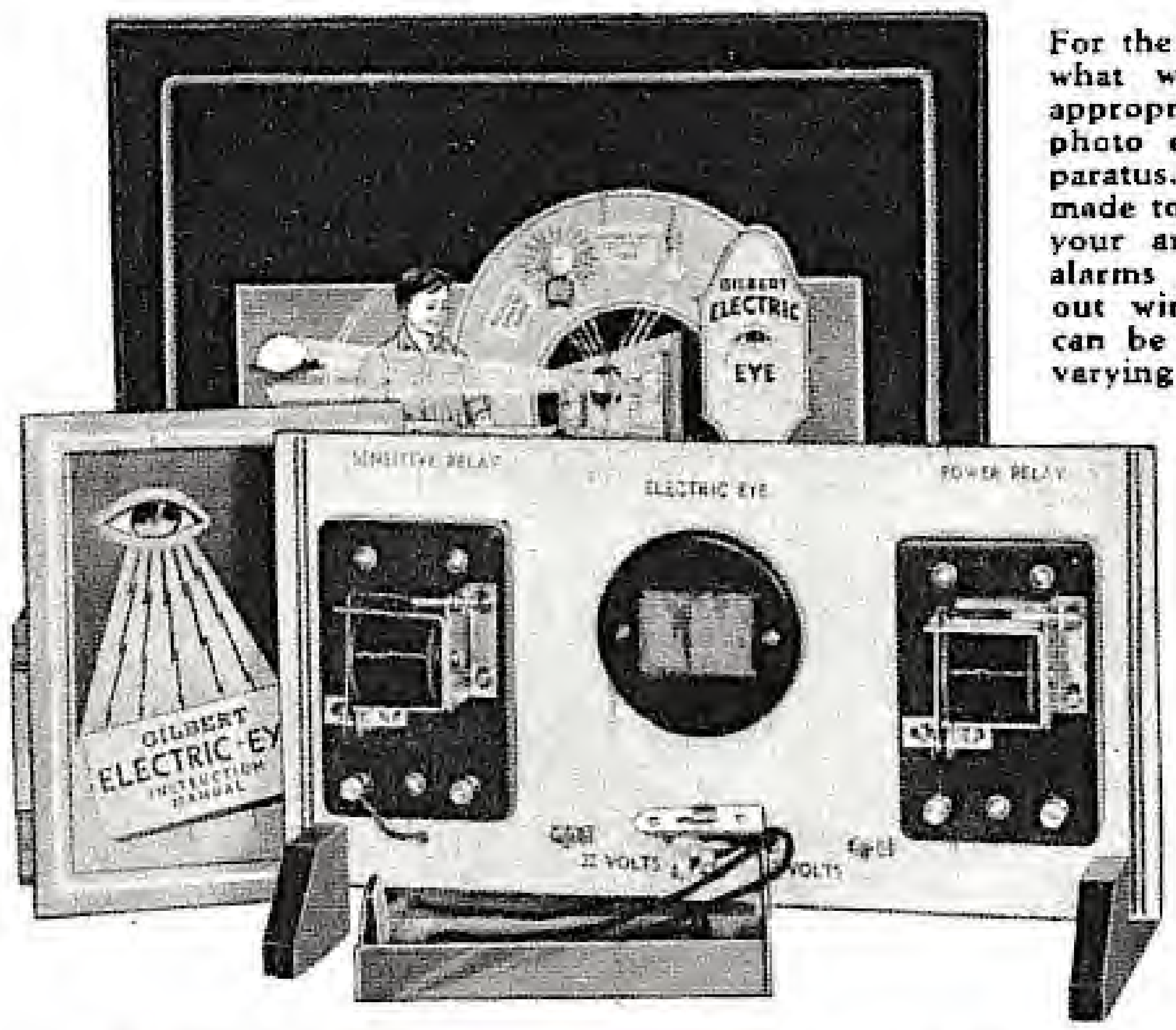
Junior will have the time of his life with one of these iron horses. Pushing on the foot levers causes the coaster to gallop just like a real horse.



For the workshop fan this practical wood turning lathe is just the thing. While inexpensive it does exceptionally fine work. Operates on light motor.

MERRY CHRISTMAS
MERRY CHRISTMAS

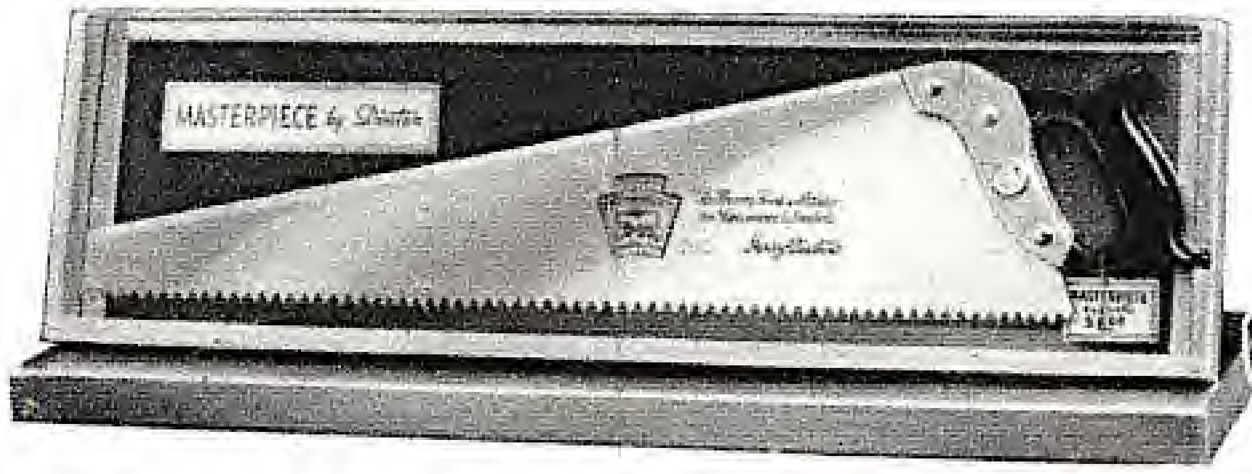
MORE CHRISTMAS SUGGESTIONS


GILBERT ELECTRIC EYE
SENSITIVE RELAY
ELECTRIC EYE
POWER RELAY
GILBERT ELECTRIC-EYE INSTRUCTION MANUAL

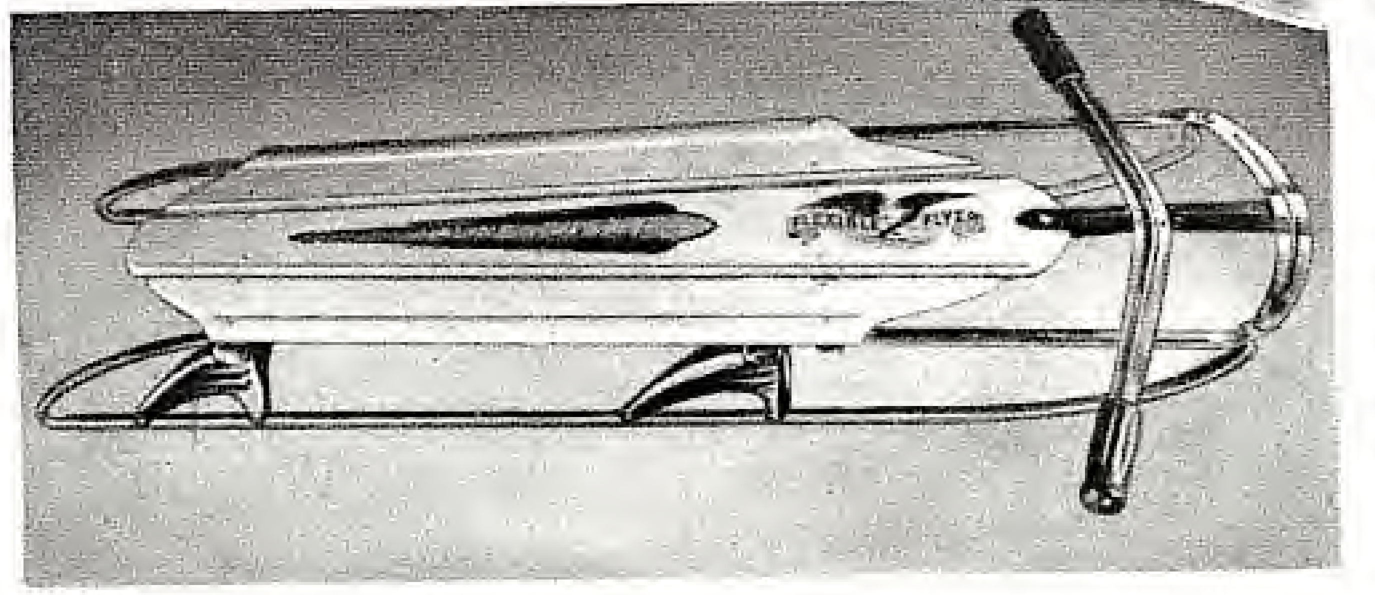
For the junior scientist what would be more appropriate than this photo electric eye apparatus. Motors can be made to run by waving your arm, burglar alarms installed without wiring and music can be produced from verying light beams.

EVEREADY
SPOTLIGHT

Any member of the family will appreciate a flashlight. This model features a chrome case and a positive contact thumb switch.

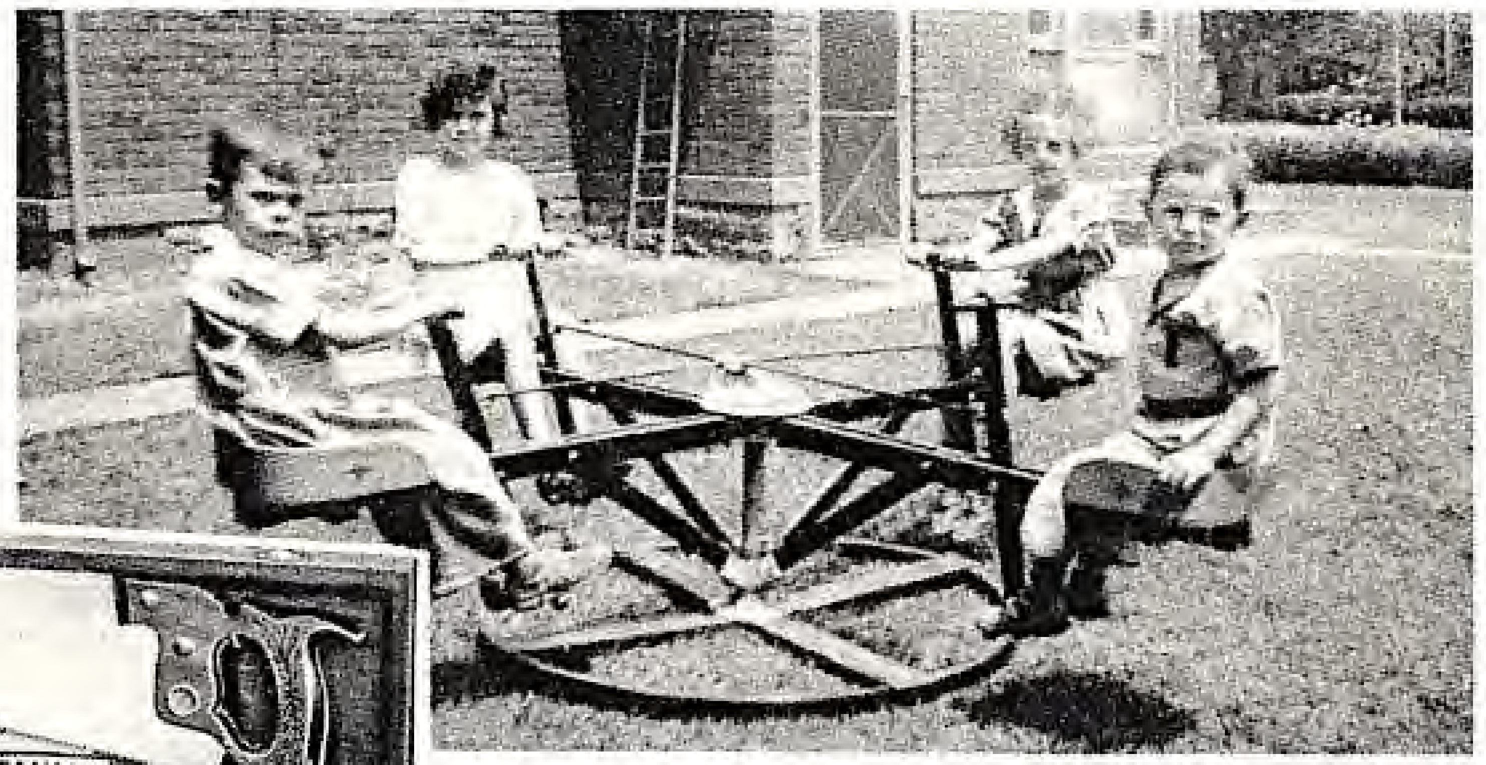

MASTERPIECE by Disston

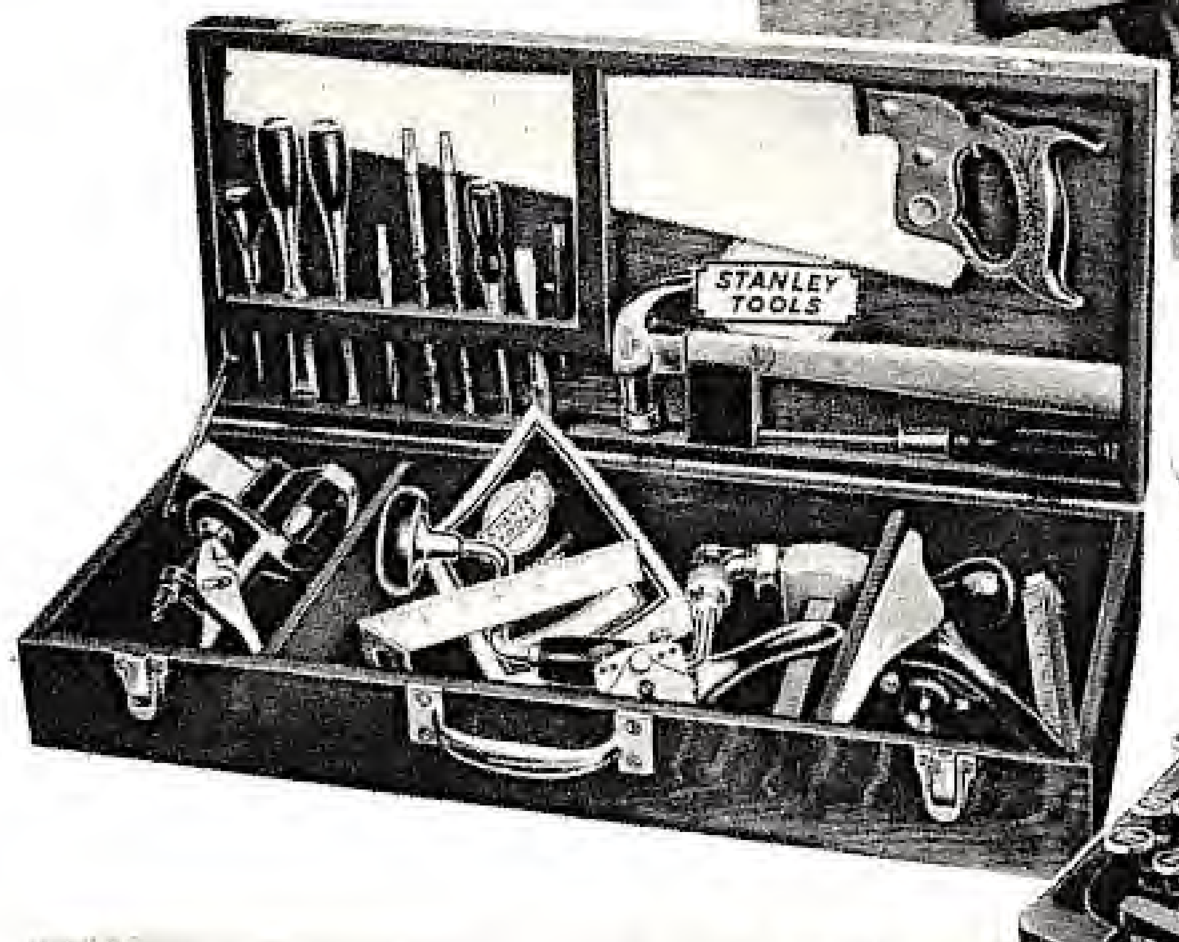
For the handy man a good saw is a worthy gift and one which he will appreciate. A streamlined sled that steers will meet the fancy of youths of all ages. An easily operated steering bar controls sled's direction.


FLEXIBLE FLYER

Another typewriter that will make an excellent gift for someone. This neat machine is the next thing to a full size type. A canoe such as the one shown below will add many pleasant hours to next summer's trip.

Around and around it goes. This toy merry-go-round operates like the familiar railroad band car and can be set up either indoors or out. It accommodates four children. Below- What shop enthusiast wouldn't appreciate this complete workshop, tool chest. Chest includes every hand type of woodworking tool used in the shop.




STANLEY TOOLS

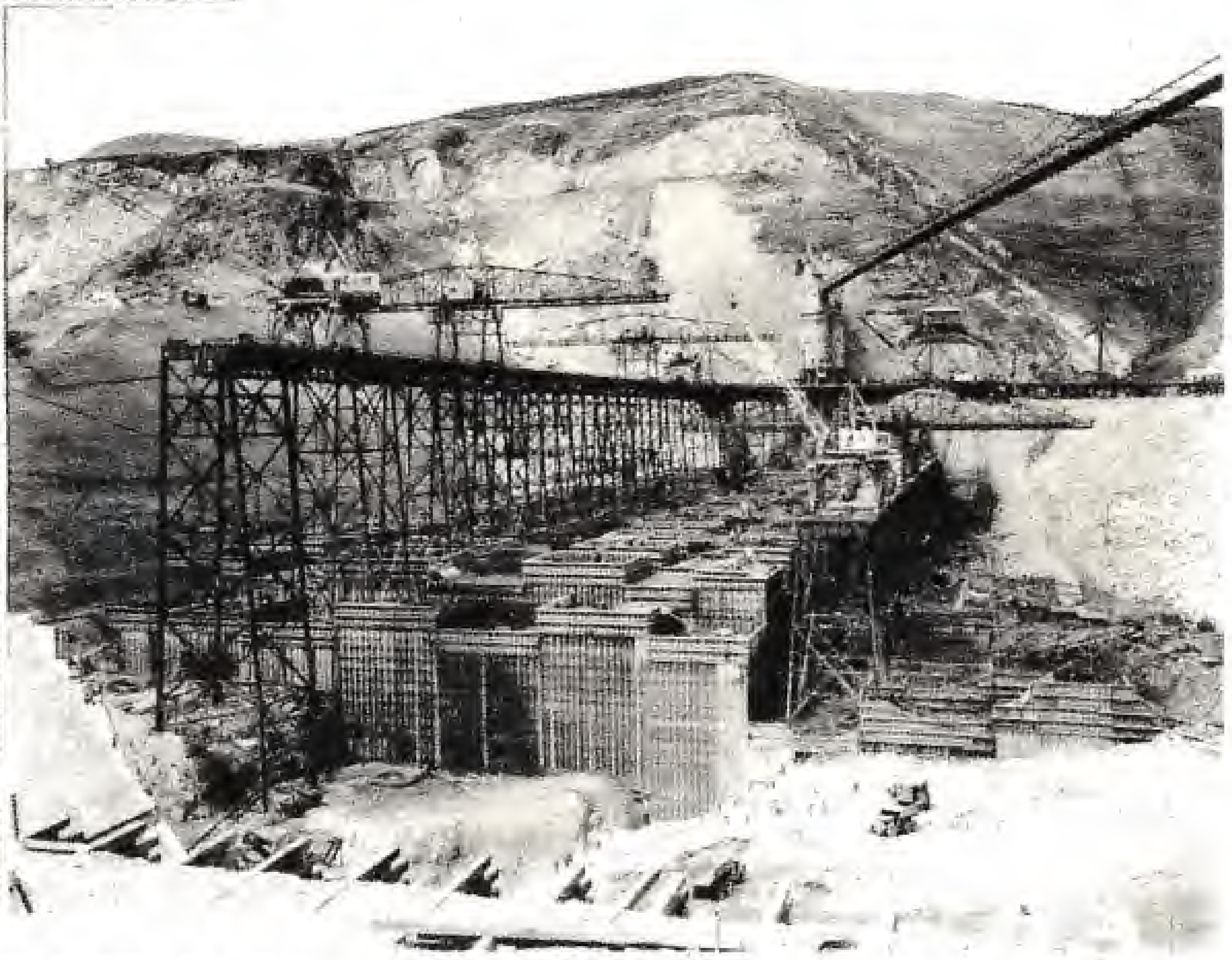
Popular for home use this new portable features a paper support rack. Extra long carriage return bar makes it easy to operate.

Balloon tires, combined horn and light and tool box case are a few of this bicycle's features. Right—An all-wave radio set is something that the whole family will enjoy for years to come.

RUSH DAMS TO END DROUGHT MENACE

This is the Columbia River, the West's finest producer of water, which will shortly be harnessed.

Huge buckets, like the one in the foreground, carry the tons of concrete from the mixers to the steel forms in the canyons far below. Each bucket has a capacity of 4 cubic yards.



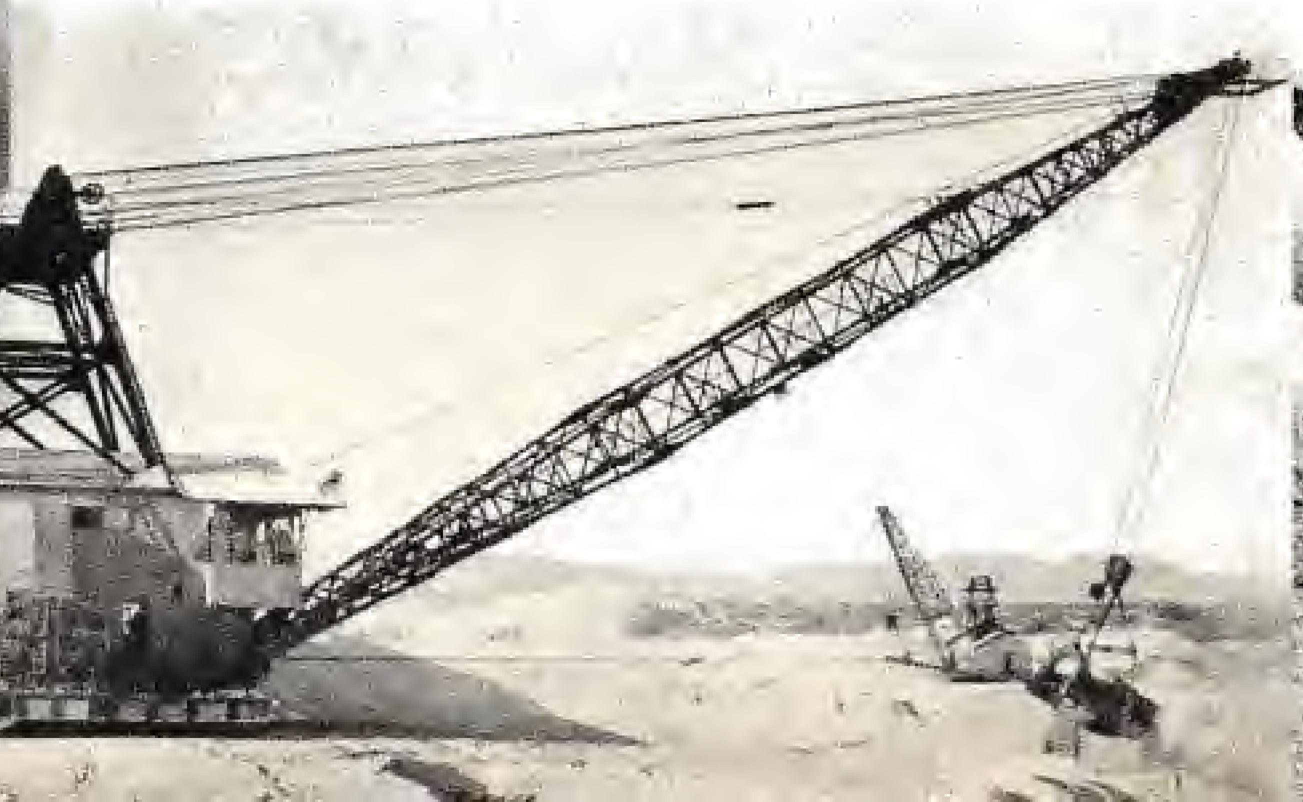
Already more than half a million cubic yards of concrete have been poured at Grand Coulee Dam and construction continues at rate of 6,000 cubic yards a day as engineers rush project.

ENGINEERS and laborers working under the direction of the United States Bureau of Reclamation are rushing toward completion four great dams that will provide irrigation for more than 2,000,000 acres of land that is now arid.

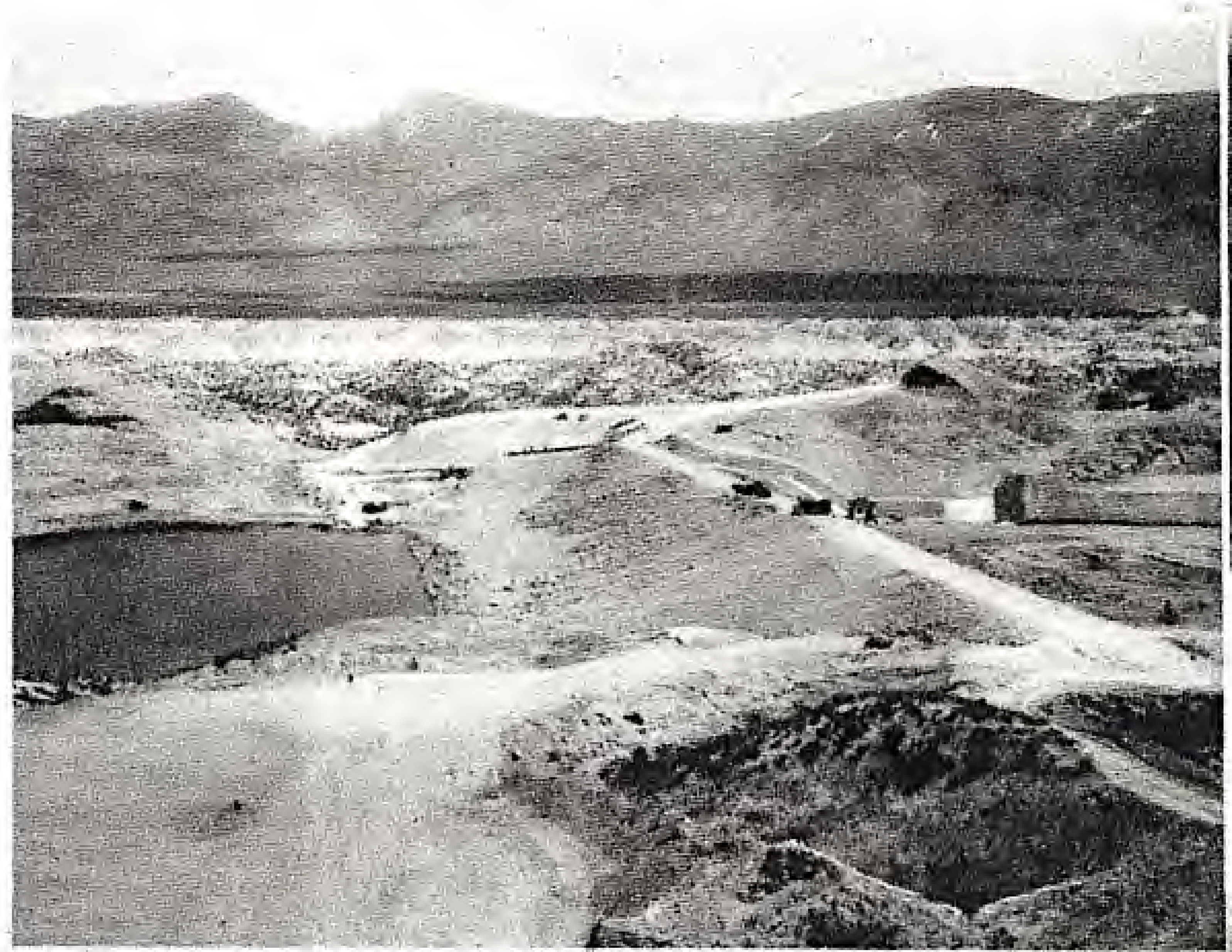
The Seminoe Dam on the turbulent North Platte River when completed will cost $8,500,000 and provide both power generation and irrigation. The Alcova Dam on the same river will be earth filled and cost about $3,500,000. A $7,000,000 canal system will carry the waters of the two dams to irrigable lands within a radius of 106 miles.

The Grand Coulee Dam in the State of Washington far exceeds the others in cost. Here dual dams are tentatively scheduled to be constructed although the $60,000,000 appropriated by Congress is for the lower dam, only. The mighty Coulee dam will open 1,200,000 acres for cultivation.

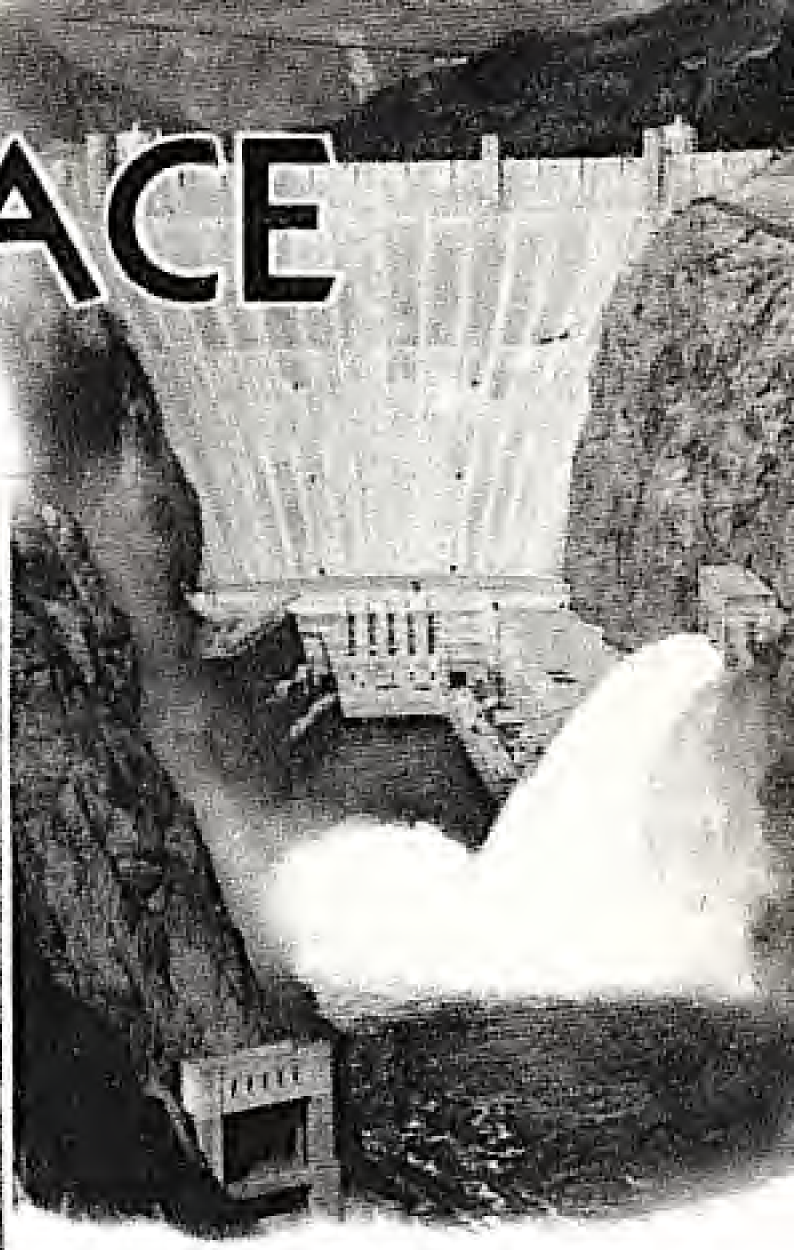
Still another dam, the Bonneville, is being erected in the great canyon of the Columbia River in Oregon where the stream pours through the Cascade Mountains. Costing $40,000,000 this dam will be in operation next year.



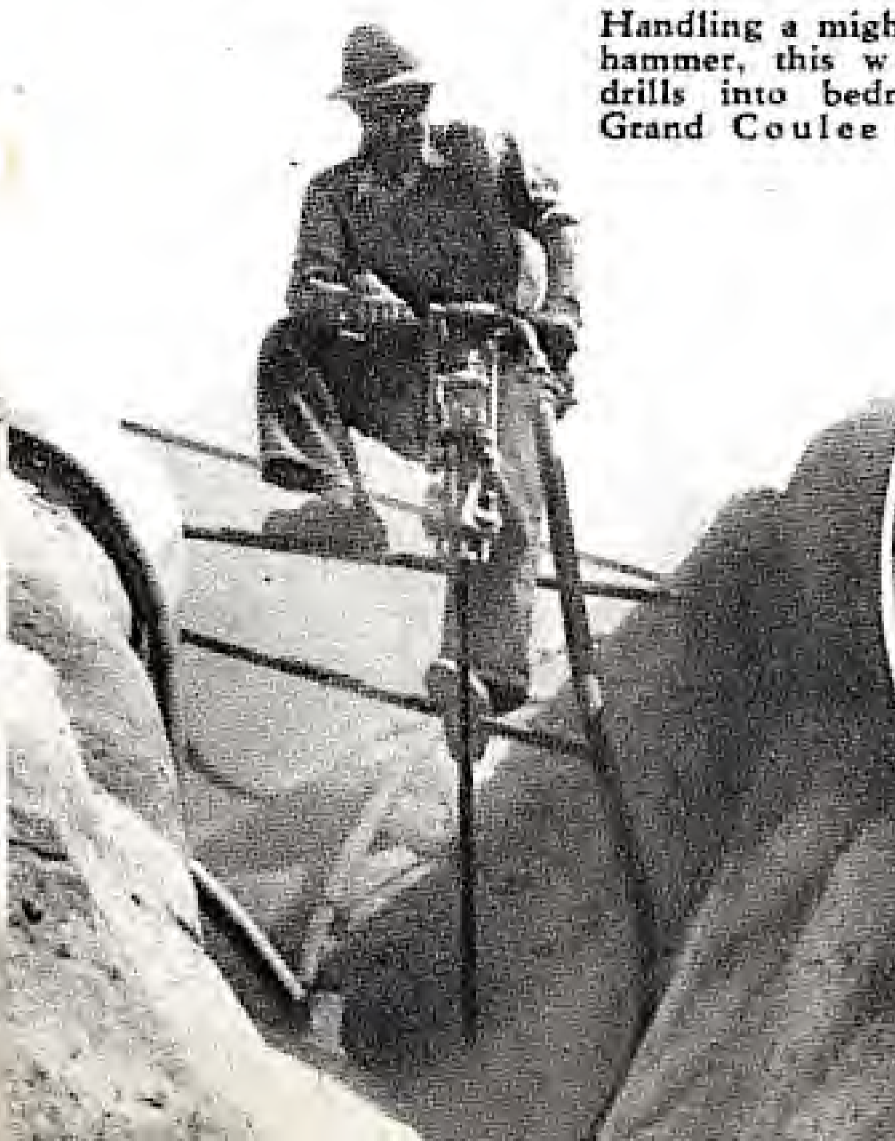
Here engineers are starting work on the 260-foot Seminoe dam by blasting the abutments. Right—Mighty excavators like this move 16 tons of soil each scoop.



This is the Rye Patch Dam in Nevada which only recently was completed. Of earth fill construction, 75 feet in height, the dam will store up the wasted waters of the Humboldt River.



Rapidly nearing completion, Boulder Dam, shown above, will not only provide arid Western States with water, but furnish abundant electricity, too. Pressing a gold telegraph key President Roosevelt recently set the first of the dam's mighty turbines roaring into operation.



Handling a mighty jackhammer, this worker drills into bedrock on Grand Coulee project.

Working under the direction of government engineers these workers are installing concrete troughs which will carry the waters of the Ogden River in Utah. The wire mesh in the bottom of the trough is for reinforcing the concrete. Left—Through these pipes flows the water of the Humboldt River in the newly completed Rye Patch Dam of Nevada. Under control, the river's value is increased immeasurably.

U. S. Bureau of Reclamation Photos

Methods Of Deer Hunting

by ROBERT PAGE LINCOLN

Bagging a swift footed deer is the crowning ambition of thousands of hunters. In this article, an experienced hunter and woodsman tells you how to bag yours.

Frank Swada, of Big Rapids, Mich., is credited with being the first man to use a motorcycle in deer hunting. He is shown here with a 198-pound buck he shot. The motorcycle constitutes a fast and economical way to reach distant hunting areas.

In still hunting, one often has the opportunity to surprise a buck, as proved by this unusual photo. This is a White-tail, or Virginia deer, a type that is hunted by over 75% of hunters.

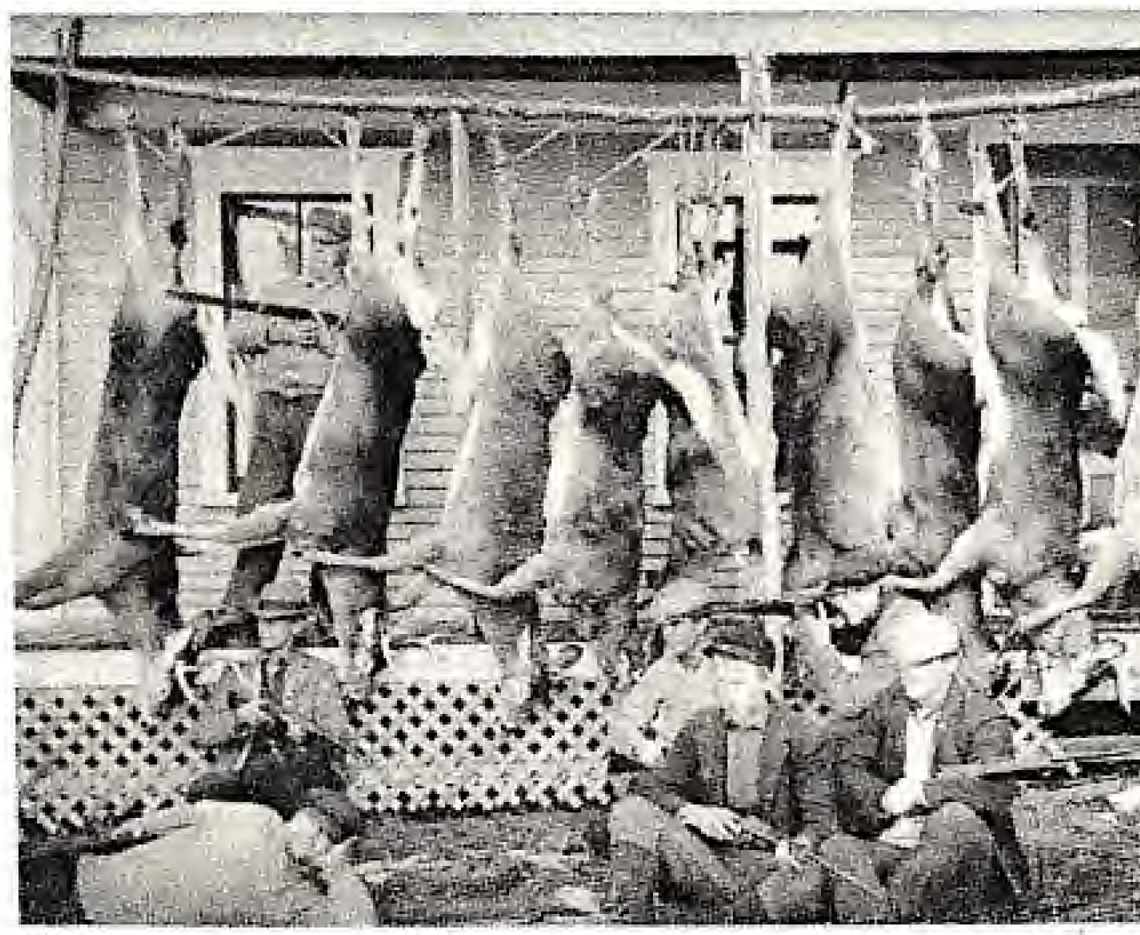
DEER hunting divides itself variously into three groups, namely, hunting in open country; hunting in mountainous country, and hunting in the wooded sections. Undoubtedly each of these three phases of hunting the Virginia or white-tailed deer, and the several other species in the north and on the Pacific Coast, must be treated differently. The conditions for hunting are often widely dissimilar. In the mountains and in the open it is necessary to speak often in terms of telescopes and long-range weapons of the high-power class, whereas, in wooded sections, the rifle used, while being a high power arm, does not necessarily have to kill at a mile to be effective.

A very great deal of the deer hunting done in the United States is for the familiar white-tail, and since it is found in woods of greater or lesser density, it is a form of hunting that is the most appealing, and in which most of our hunters engage. This deer is hunted either by what is known as the drive-method or by still-hunting in the north and the east, while in the South it is hunted with hounds, a method that is strictly forbidden in the North, where it is unlawful. The reason for the use of hounds in the South lies in the fact that the cover in which the deer are found is generally so dense as to make hunting impossible. In the South, shotguns loaded with buckshot are used in deer hunting. Very rarely is the shotgun with like shot used in the North. There some form of rifle is always the weapon selected for the kill.

In drive-hunting the deer a group of hunters walk through a considerable woods working toward a certain vantage point or where trails, known to be used by the deer, come out. Commanding a view of these outlet trails, several of the more experienced hunters stand watch, ready to shoot when the animals issue forth, frightened out by the beaters. While this may seem to be an air-tight proposition and a kill is certain, still it is a fact that deer slip by the beaters and a drive turns out unsuccessful.

The method of still-hunting is favored by fully seventy-five per cent of the hunting element and is the one that might be considered the most effective most of the time in most wooded regions. There is nothing difficult with regard to this form of hunting. It simply involves moving through the woods with due care and as soundlessly as possible, aiming to surprise a deer and to drop him before he has a chance to get away. Sometimes, snow permitting, one has a trail of a buck to follow which adds much to the interest of the hunt, in that one knows he has a specimen in front of him somewhere and may come up on him at any time. Still hunting, or deer stalking, is the natural way of hunting. Some do not favor it because

[Continued on page 124]



Above—While some woodsmen kill deer at very close range by stalking, using a small .22 caliber rifle, amateur hunters should always use a high powered rifle. Small caliber rifles drill a hole about the thickness of a pencil in size, failing to drop the deer unless the shot is a heart or head shot. High powered rifles tear a large hole in the deer, as shown here, making his trail of blood easy to follow and flooring the deer within short distance. Left—A good day's haul by a hunting party in Indiana. Deer hunting has many devotees throughout the U. S.

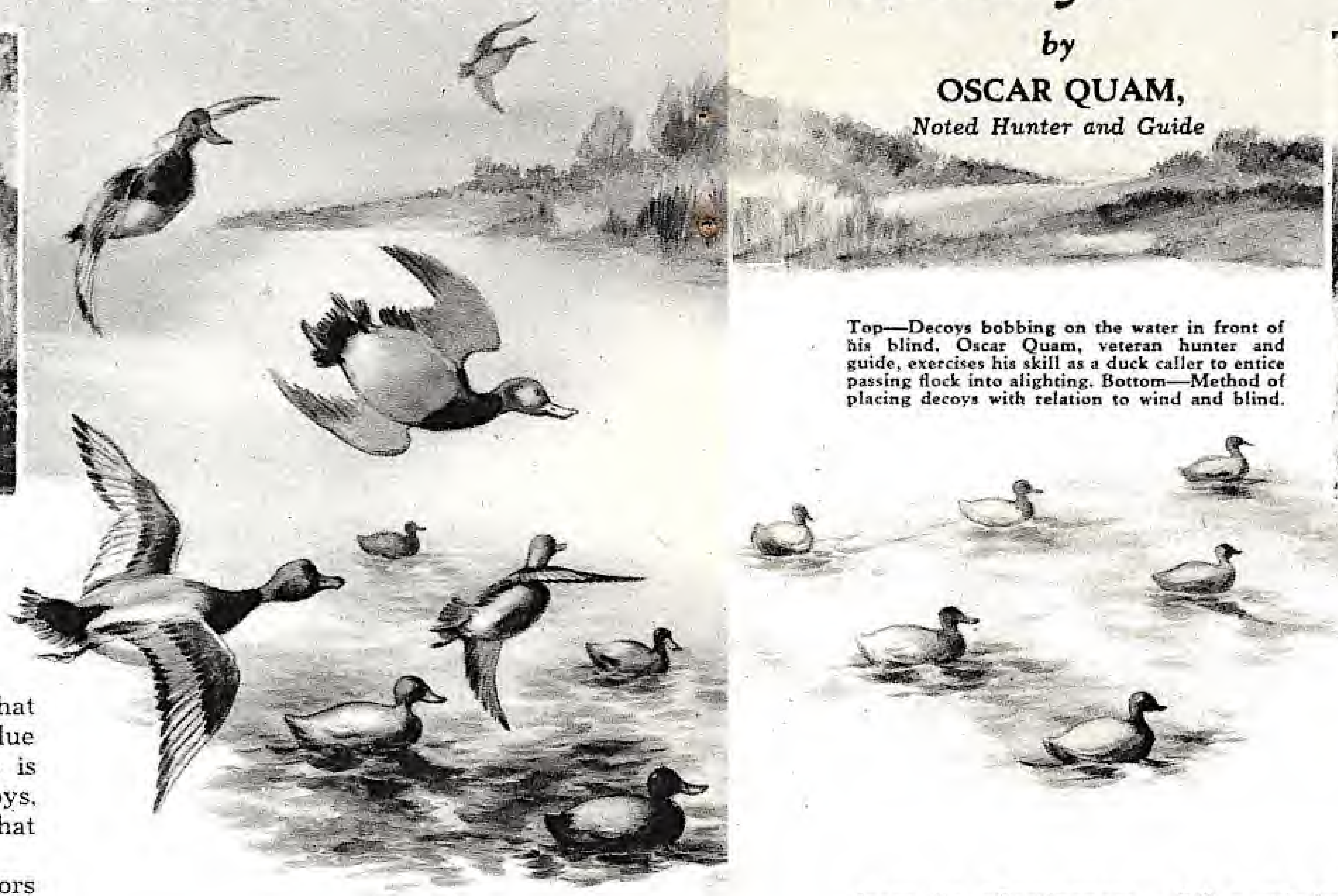
How To Use Decoys

by

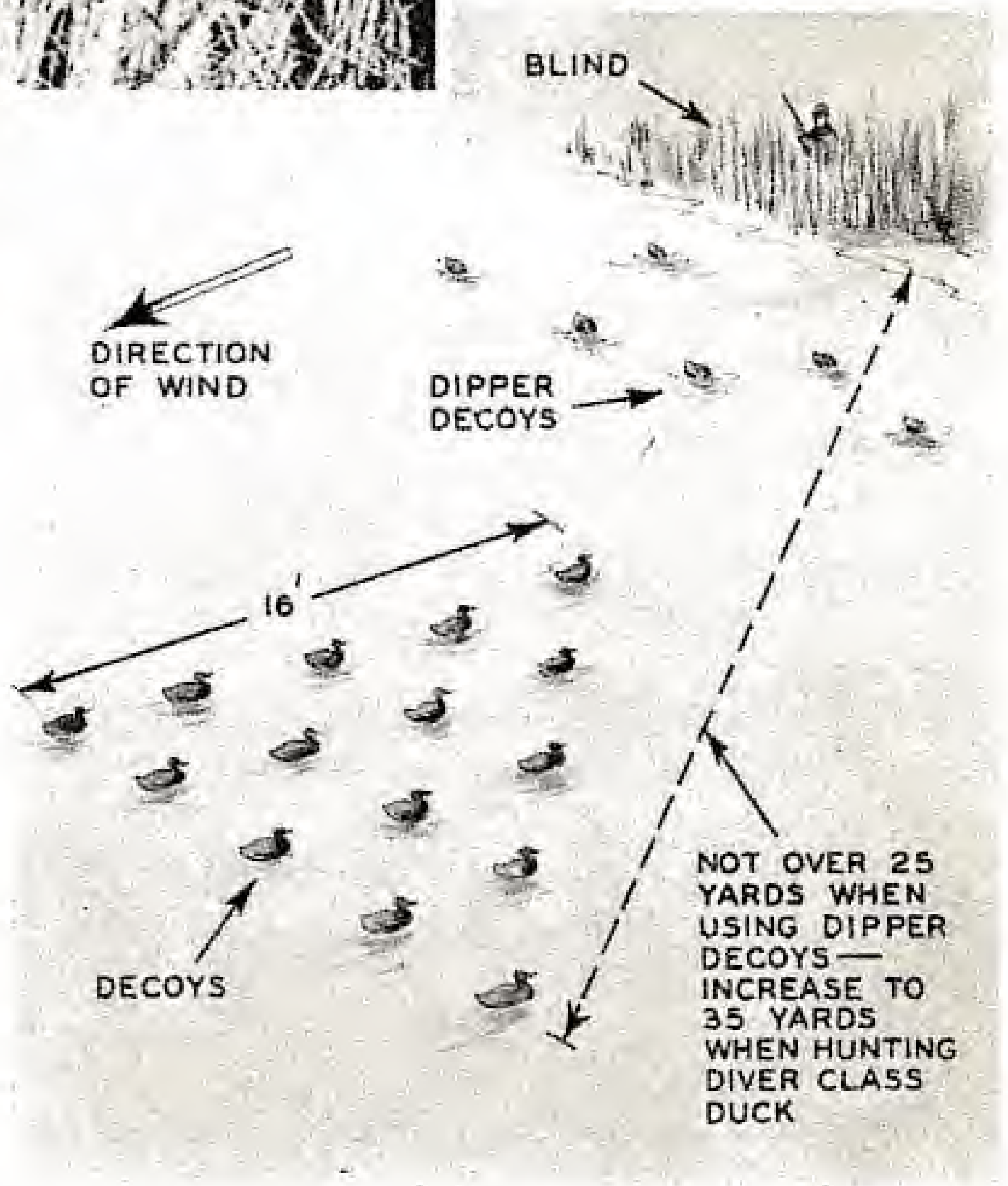
OSCAR QUAM,

Noted Hunter and Guide

Oscar Quam, the author (right), and a friend ready to test a blind. Locating a good blind and using the proper decoys are just as important as the duck calling ability of the hunter in insuring a full bag.



Top—Decoys bobbing on the water in front of his blind. Oscar Quam, veteran hunter and guide, exercises his skill as a duck caller to entice passing flock into alighting. Bottom—Method of placing decoys with relation to wind and blind.


BLIND
DIRECTION OF WIND
DIPPER DECOYS
16'
DECOYS
NOT OVER 25 YARDS WHEN USING DIPPER DECOYS—INCREASE TO 35 YARDS WHEN HUNTING DIVER CLASS DUCK

MOST duck hunters seem to think that the success of a good duck caller is due solely to his duck calling ability. This is erroneous, as the associated factor of decoys, blind, and art of locating are so essential that one is of little value without the other.

Decoys and decoy setting are main factors in duck hunting today. A hunter who ignores decoy shooting, and relies on pass shooting, will have to invent new guns as well as shells.

The southern duck hunters may not fall for my version of a decoy set, because their conditions are different. When the ducks reach them in December or later, the males of all species are in full plumage. But in northern zones our season starts in October. At this time of the year the male's coloring is the same as that of the female. The coloring of the plumage of the males does not become distinct until November first. To us in the northern zone it ought to be clearly seen that a decoy set carrying nine decoys painted in full plumage of the male and three with that of the female, would be a dead give away as a decoy set when no such plumage appeared in the real duck.

For years I have recognized this fact and would not use any decoy carrying the plumage of the male. I further saw that the two classes of ducks, the dipper and the diver class, never agree together. The diver class hates the dipper class and the dipper class hates the diver class. When hunting canvasbacks with mallard decoys, as a rule you are out of luck. The same holds true in using canvasback decoys hunting mallards.

The females of all species of ducks have practically the same coloring and I saw a chance to make a decoy that would act as a universal set attractive to all species of ducks. They are painted in the dull coloring of the female but carry no distinct breed. With these decoys I am set for any kind of duck. With the duck call I can make these decoys appear the same as the flock that is flying in front of the blind. I attribute much of my success as a hunter to this decoy.

Decoys should be large so they show at a distance. I prefer a decoy made out of a good grade of cork. They are light and set high on the water, making a very showy decoy. They are not as strong as wooden decoys and the hunter must be more careful with them. In rice beds with heavy vegetation they ride high and take a very little wind to cause movement. A decoy without movement loses its effectiveness. Off a windy point these decoys ride over the waves and can be seen clearly. Heavy wooden decoys dive into the waves and become invisible.

Decoys that are cut flat with a large resting place on the water are impossible to weight so they will right themselves in water. On a windy day the waves will turn them over and they stay in that position. Decoys should be cut like that of the old style decoy, the sides tapering down to where the weight is fastened. This insures easy movement of decoy as well as a guard against the decoy not righting itself when the wind and waves turn it over.

If a duck hunter has been observing he will have noticed a flock of ducks lighting on the water, the lead duck first, behind the leader 2 alight, 3 back of the two, and so on. They light in formation and in a very compact group.

In my decoy set I carry this formation out in every way. Fifteen decoys should be set inside a 16-foot triangle, and set in the following formation: the outer row should contain five decoys in a line, set two and one-half feet apart, next row four decoys, next three, and so on. This makes a 5-4-3-2-1 or a fifteen decoy set. Between these decoys and the blind I place six dipper decoys. Dipper decoys are half decoys, balanced in an upright position, giving the effect of a duck dipping down and feeding. This formation gives the effect of the fifteen decoys swimming up to the dipper decoys that are feeding.

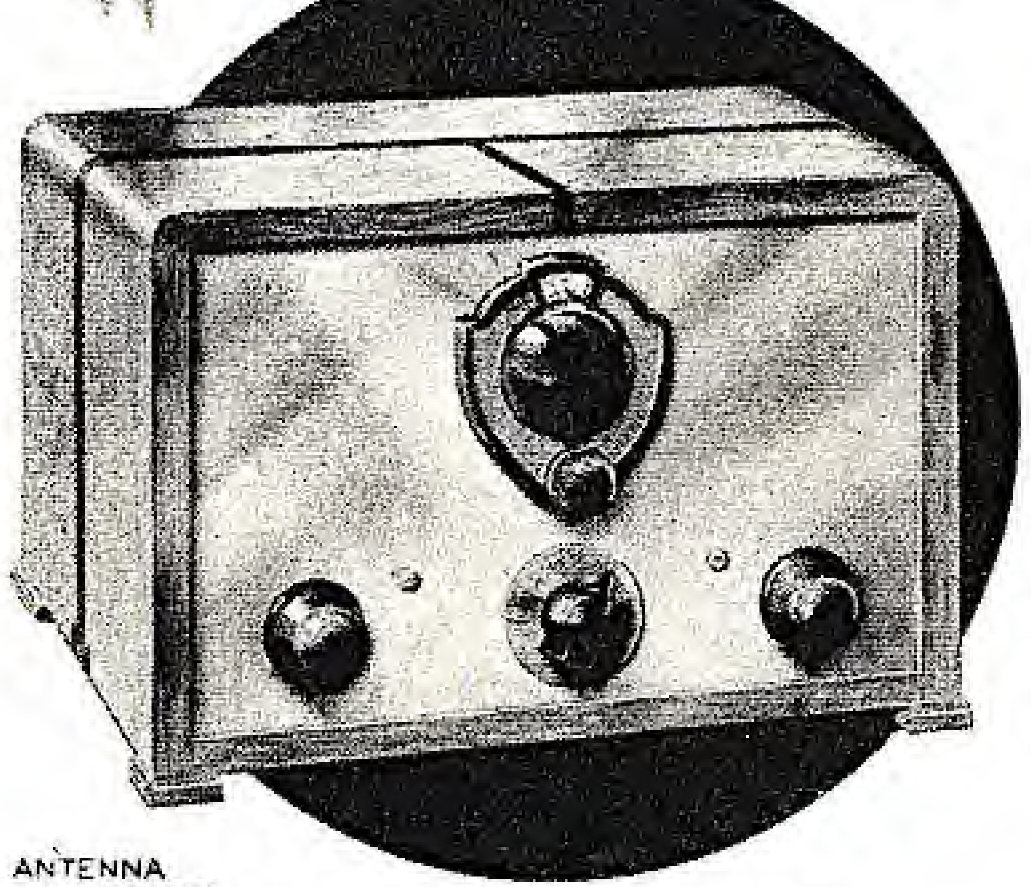
As a decoy set for the northern hunter to start the season with, I would suggest this fifteen decoy set plus the six dipper decoys. As the season nears the time of migration and the ducks appear in larger flocks, I would

[*Continued on page* 132]

Metal Tube "DX-ER" Features Band Spread All-Wave Tuning

This modernized version of the popular regenerative set presents a new type of coil coupling and features band spread tuning and metal tubes

by WM. J. VETTE



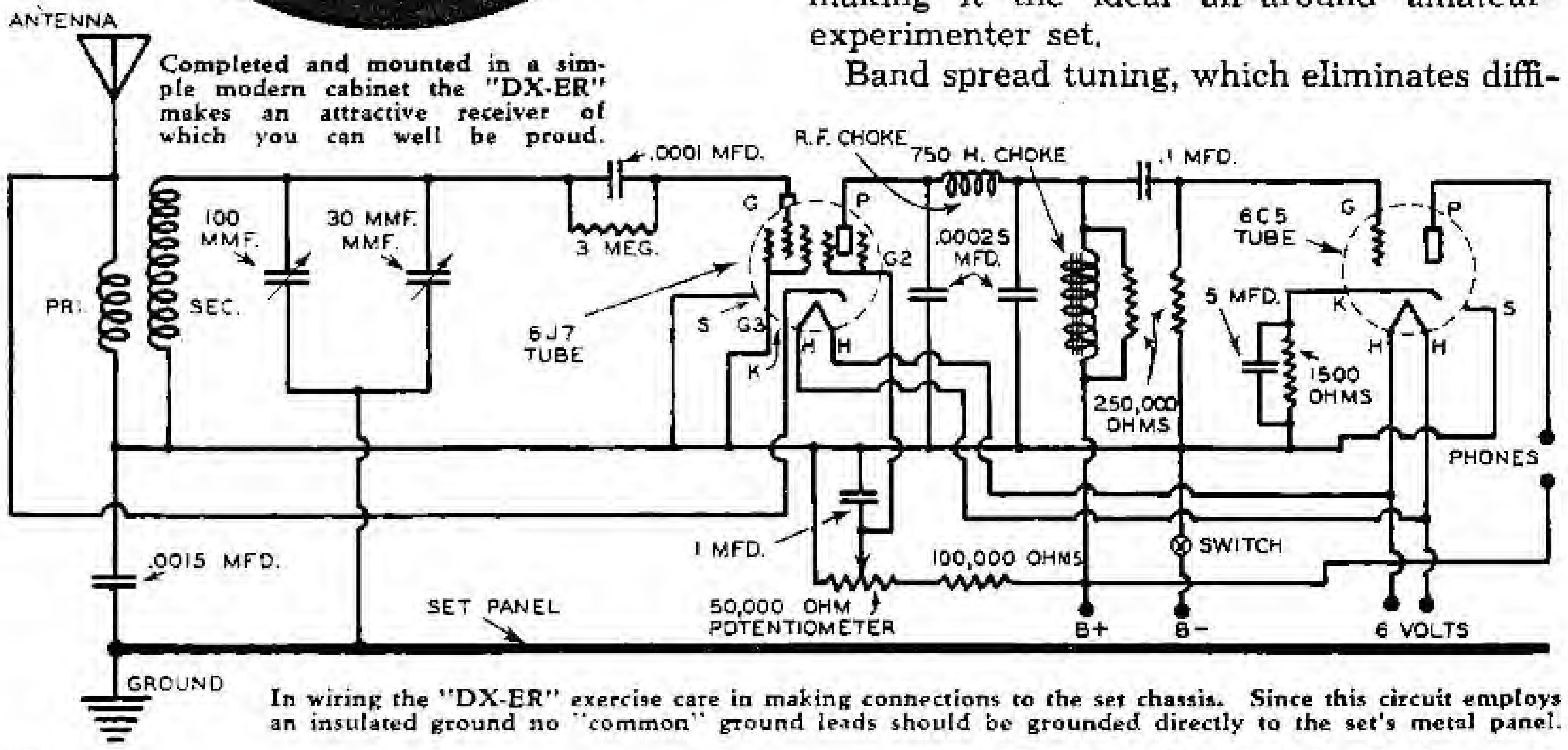
Completed and mounted in a simple modern cabinet the "DX-ER" makes an attractive receiver of which you can well be proud.

DESPITE the popularity of the multi-tubes superhetrodyne receivers the little two and three tube regenerative sets still find high favor among the amateurs and experimenters. The majority of these little sets when properly designed and built from good quality parts are capable of really surprising results. Just such a receiver is the "DX-ER" which, while very simple and compact, is capable of startling reception both with earphones and loudspeaker.

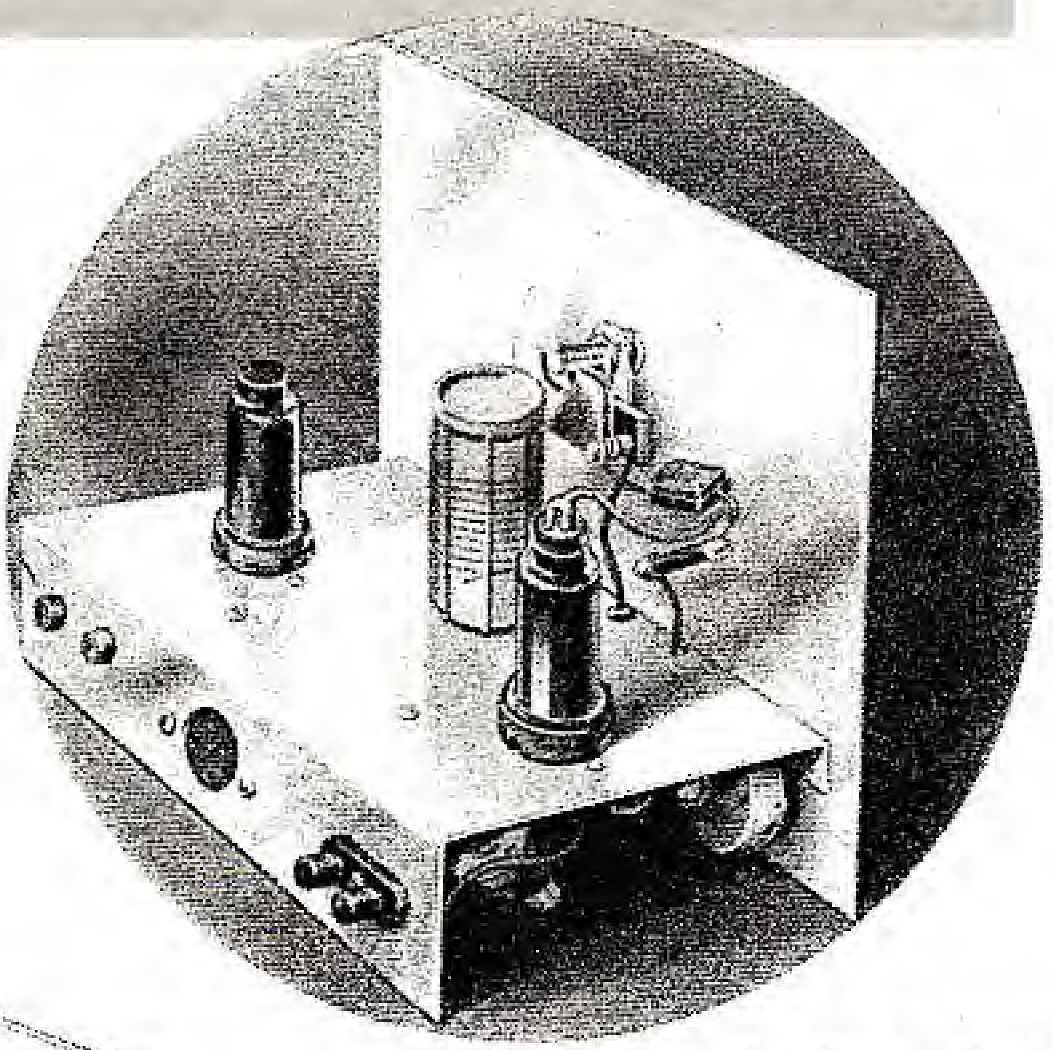
The reason often given for not building a simple receiver is that these sets usually lack certain features found only in de luxe sets. In this instance, though, the extra features have been incorporated into the circuit making it the ideal all-around amateur-experimenter set.

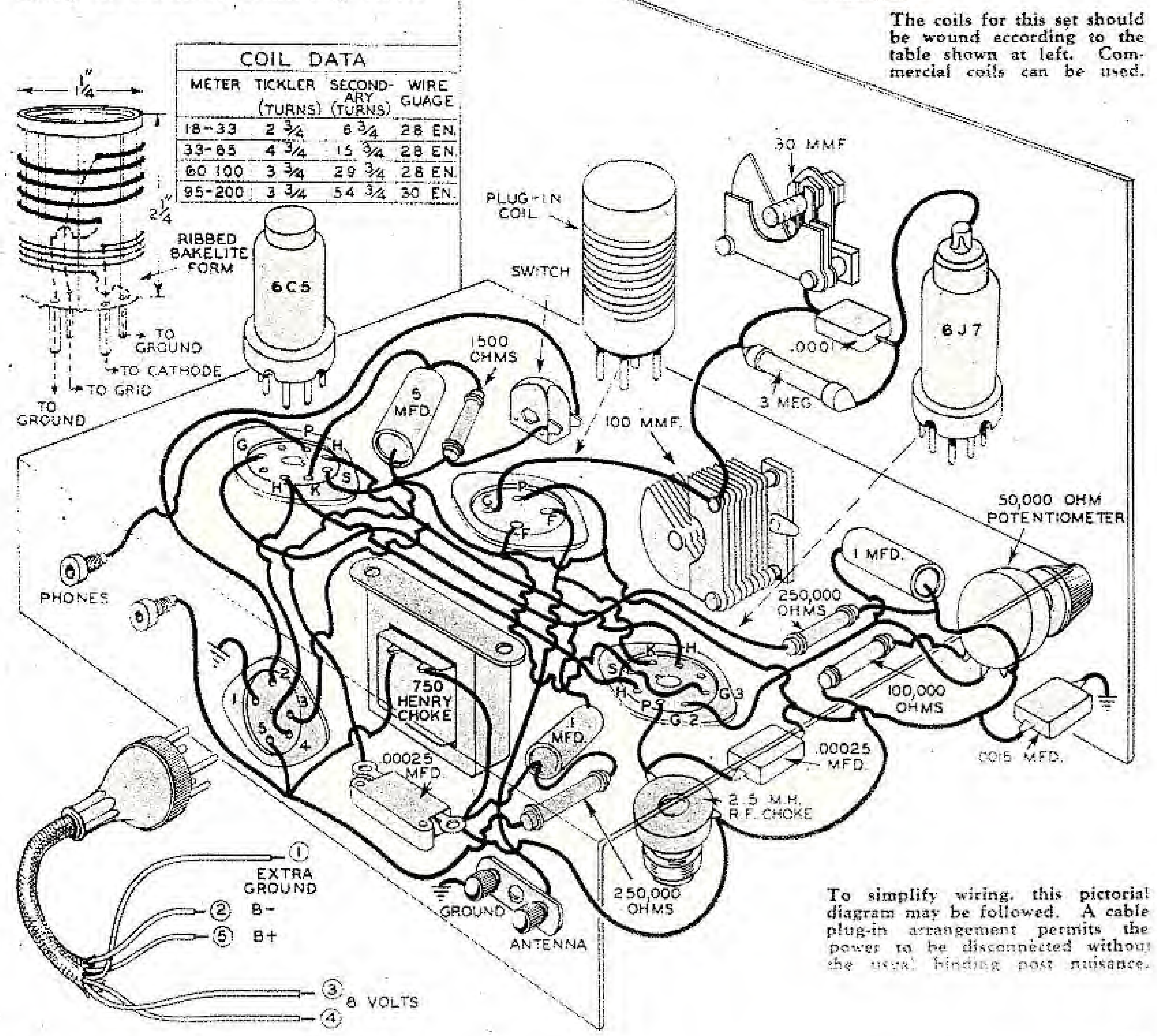
Band spread tuning, which eliminates difficult tuning, metal tubes and electronic antenna coupling are a few of the features found on the "DX-ER." An auxiliary power supply permits the set to operate directly from 110-volt house current if battery operation is not desired.

The set is constructed on a chassis formed from sheet aluminum or alloy. While there is no definite size for the chassis it should be small enough so that parts can be mounted compactly. If the builder so desires he can secure a ready made chassis from any radio parts supply house with all socket and mounting holes already punched. The parts, which can easily be obtained from any radio


ANTENNA
100 MMF.
30 MMF. MMF.
.0001 MFD.
3 MEG.
R.F. CHOKE
750 H. CHOKE
.1 MFD.
G
P
G2
S
G3
K
H
H
6J7 TUBE
.00025 MFD.
250,000 OHMS
5 MFD.
1500 OHMS
6C5 TUBE
G
P
K
S
H
H
PHONES
PRI.
SEC.
.0015 MFD.
SET PANEL
1 MFD.
100,000 OHMS
SWITCH
50,000 OHM POTENTIOMETER
B+
B-
6 VOLTS
GROUND

In wiring the "DX-ER" exercise care in making connections to the set chassis. Since this circuit employs an insulated ground no "common" ground leads should be grounded directly to the set's metal panel.



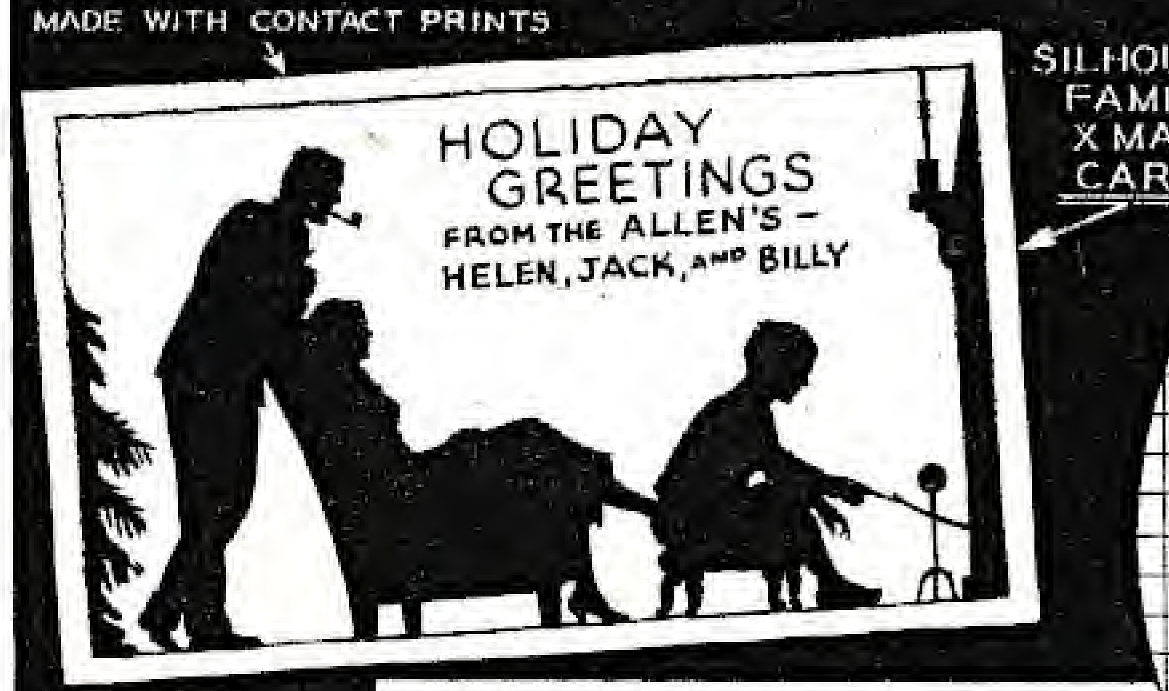

1¼"
2¼"
RIBBED BAKELITE FORM
TO GROUND
TO CATHODE
TO GRID
TO GROUND
6C5
PLUG-IN COIL
SWITCH
30 MMF.
6J7
.0001
3 MEG.
1500 OHMS
5 MFD.
100 MMF.
P
G
H
H
K
S
P
F
F
50,000 OHM POTENTIOMETER
1 MFD.
250,000 OHMS
PHONES
750 HENRY CHOKE
K
H
S
H
P
S
G3
G-2
100,000 OHMS
1 MFD.
.00025 MFD.
.00025 MFD.
.005 MFD.
2.5 M.H. R.F. CHOKE
250,000 OHMS
GROUND
ANTENNA
1
2
3
4
5
① EXTRA GROUND
② B-
⑤ B+
③ 8 VOLTS
④

COIL DATA			
METER	TICKLER (TURNS)	SECONDARY (TURNS)	WIRE GUAGE
18-33	2 ¾	6 ¾	28 EN.
33-65	4 ¾	15 ¾	28 EN.
60 100	3 ¾	29 ¾	28 EN.
95-200	3 ¾	54 ¾	30 EN.

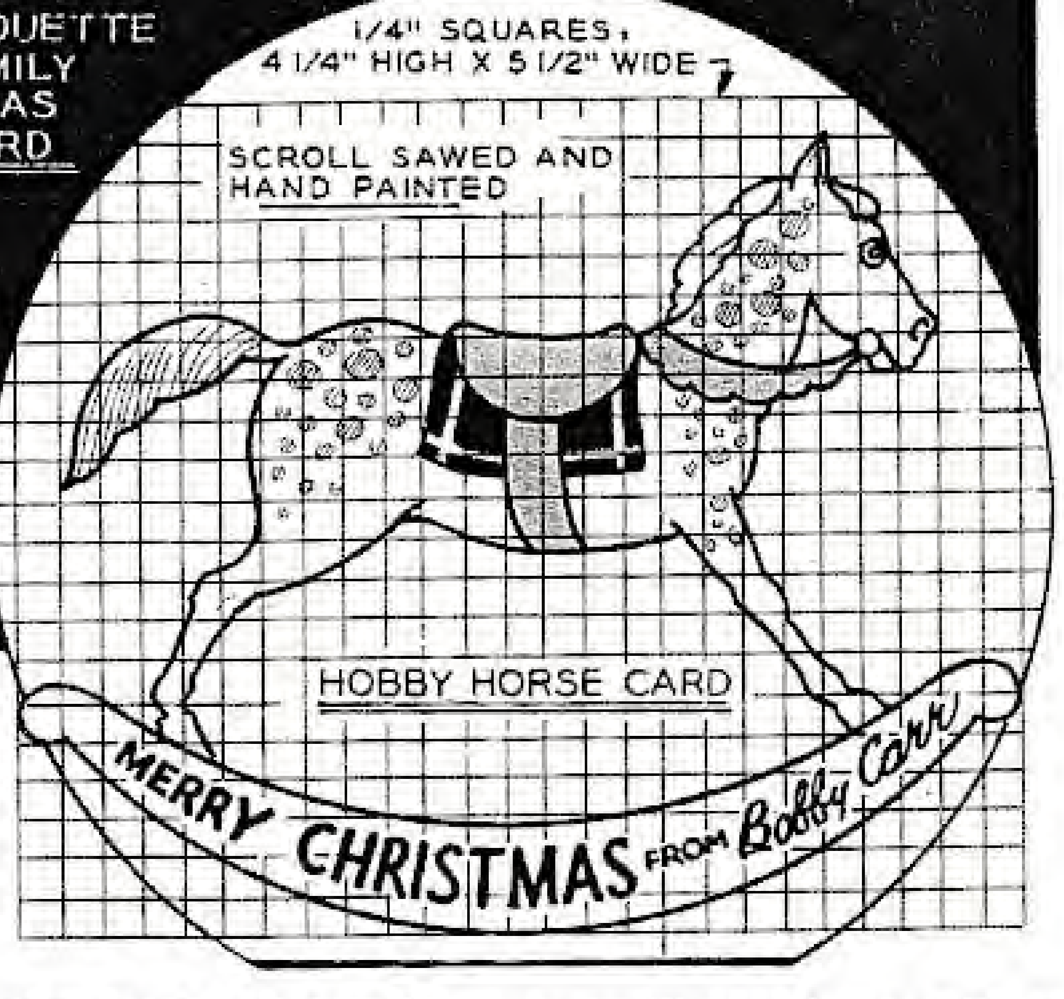
The coils for this set should be wound according to the table shown at left. Commercial coils can be used.

To simplify wiring, this pictorial diagram may be followed. A cable plug-in arrangement permits the power to be disconnected without the usual binding post nuisance.

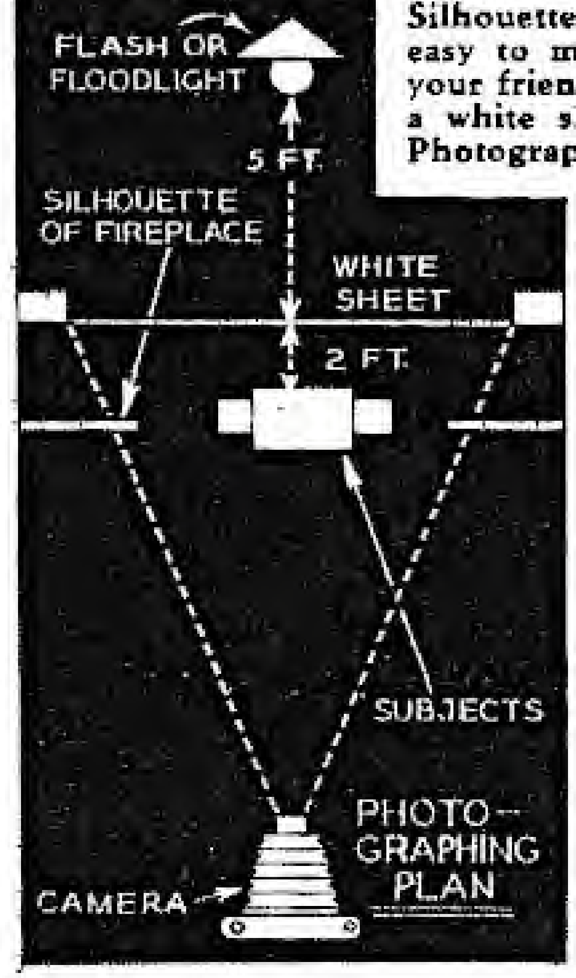
Original Christmas Greeting Cards Everyone Can Make


MADE WITH CONTACT PRINTS
HOLIDAY GREETINGS
FROM THE ALLEN'S – HELEN, JACK, AND BILLY
SILHOUETTE FAMILY X MAS CARD

Silhouette greeting cards like this one are easy to make and will be appreciated by your friends. The pictures are taken before a white sheet illuminated from the rear. Photographic arrangement appears at left

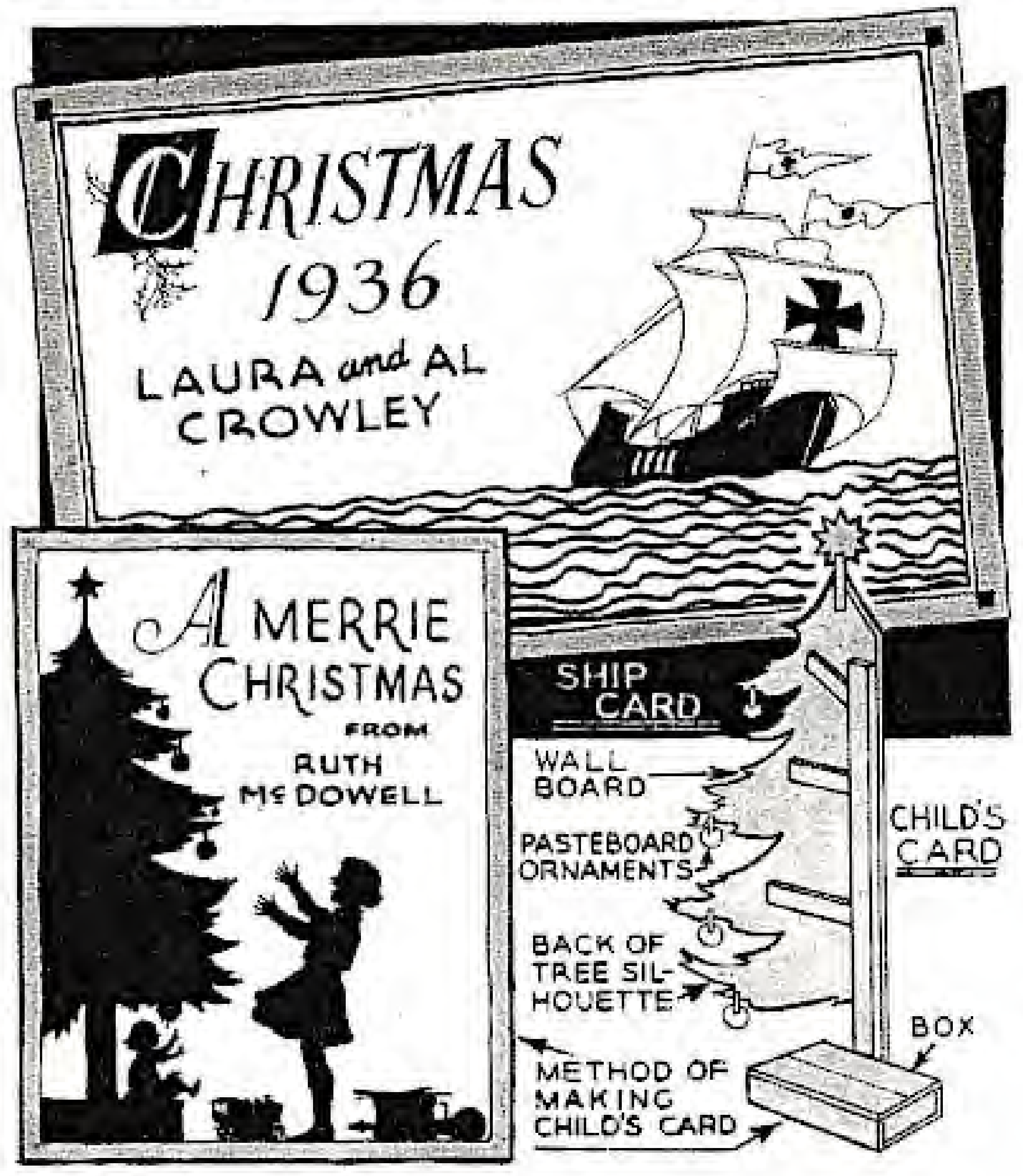

1/4" SQUARES, 4 1/4" HIGH X 5 1/2" WIDE
SCROLL SAWED AND HAND PAINTED
HOBBY HORSE CARD
MERRY CHRISTMAS FROM Bobby Carr

This rocking Hobby Horse card will appeal especially to children. The horse is traced on bristol board from this pattern inked and then colored in wax crayon or water colors.


FLASH OR FLOODLIGHT
5 FT.
SILHOUETTE OF FIREPLACE
WHITE SHEET
2 FT.
SUBJECTS
CAMERA
PHOTO-GRAPHING PLAN

Billy
Merry Christmas

Greetings such as the one pictured at the right are even more interesting than the silhouette type. After mounting picture and adding the necessary atmosphere and lettering it is copied and sepia or dull white prints made. Cards may be colored too


CHRISTMAS 1936
LAURA and AL CROWLEY
SHIP CARD
A MERRIE CHRISTMAS FROM RUTH McDOWELL
WALL BOARD
PASTEBOARD ORNAMENTS
BACK OF TREE SIL-HOUETTE
CHILD'S CARD
BOX
METHOD OF MAKING CHILD'S CARD

GREETING cards have always been an expression of friendliness during the Christmas season and can be made more so when of your own original design. Such cards not only provide a more lasting remembrance, but also provide their senders with a lot of pleasure in making them.

Of all original Christmas greeting cards the photographic type is probably the most popular although in recent years the novelty card has been chosen by many. Both types are shown in the accompanying illustrations so that you can make your own choice.

Although requiring slightly more preparation the photographic card is by far the simplest to make if a quantity is desired. Both the picture and silhouette cards are very attractive and not at all difficult to make. Silhouettes are photographed before a white cloth screen behind which a floodlight or flash lamp is placed. The subjects are arranged before the screen and the picture snapped.

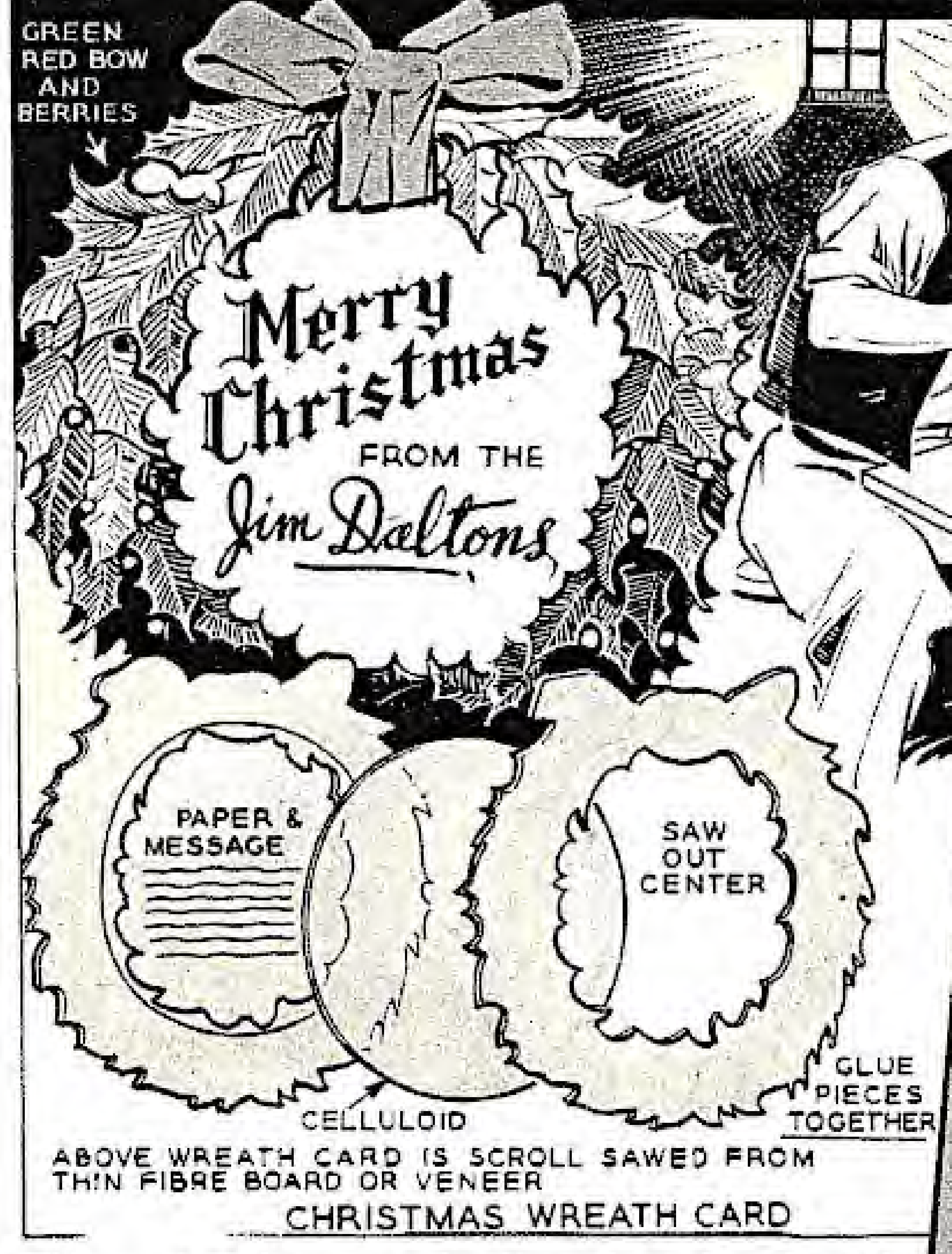
Another negative containing the greeting is placed over the silhouette and the two printed at the same time so that when developed the photo card contains both the picture and message. To make the greeting negative first letter the words on white paper using India ink. Photograph this in the usual manner so that the resulting negative is black except where the letters appear.

In making plain greeting photographs it is often possible to write the message directly on the negative with black masking varnish so that both message and picture print at the same time. Where a more elaborate card is desired it may be photographed from several other pictures arranged in an attractive layout. A little experimenting will result in numerous ideas suitable for greeting card use.

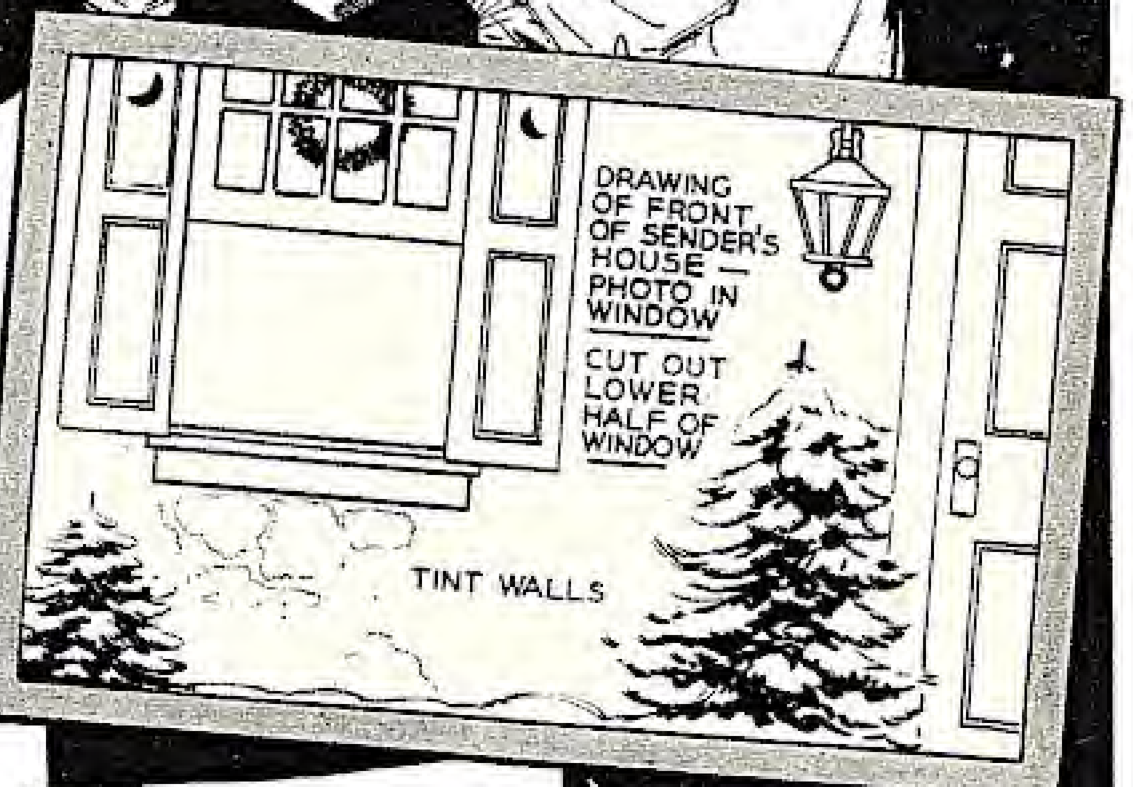
Novelty cards are interesting pastime for children of all ages and their styles range from simple crayon colored cards to the more elaborate plywood cut-outs. For the simple cards a good grade of bristol board may be used. The picture on the card can be traced from a magazine illustration then crayoned-in. The older child can letter in the greeting in ink or water colors instead of using crayons with a neater card resulting.

If you have a number of small family group photographs they can be attractively mounted in a greeting folder provided with a cut-out flap. The front of the card has the design of a window painted on it with the lower half cut out. Inside is mounted the

[Continued on page 126]


GREEN RED BOW AND BERRIES
Merry Christmas FROM THE Jim Daltons
PAPER & MESSAGE
SAW OUT CENTER
CELLULOID
GLUE PIECES TOGETHER
ABOVE WREATH CARD IS SCROLL SAWED FROM THIN FIBRE BOARD OR VENEER
CHRISTMAS WREATH CARD

This novel Christmas greeting is cut from thin plywood and assembled with waterproof cement. The message is protected from damage by the celluloid window. A tag attached permits it to be sent through the mail. A plywood Christmas tree can be made from the same material.


DRAWING OF FRONT OF SENDER'S HOUSE — PHOTO IN WINDOW
CUT OUT LOWER HALF OF WINDOW
TINT WALLS

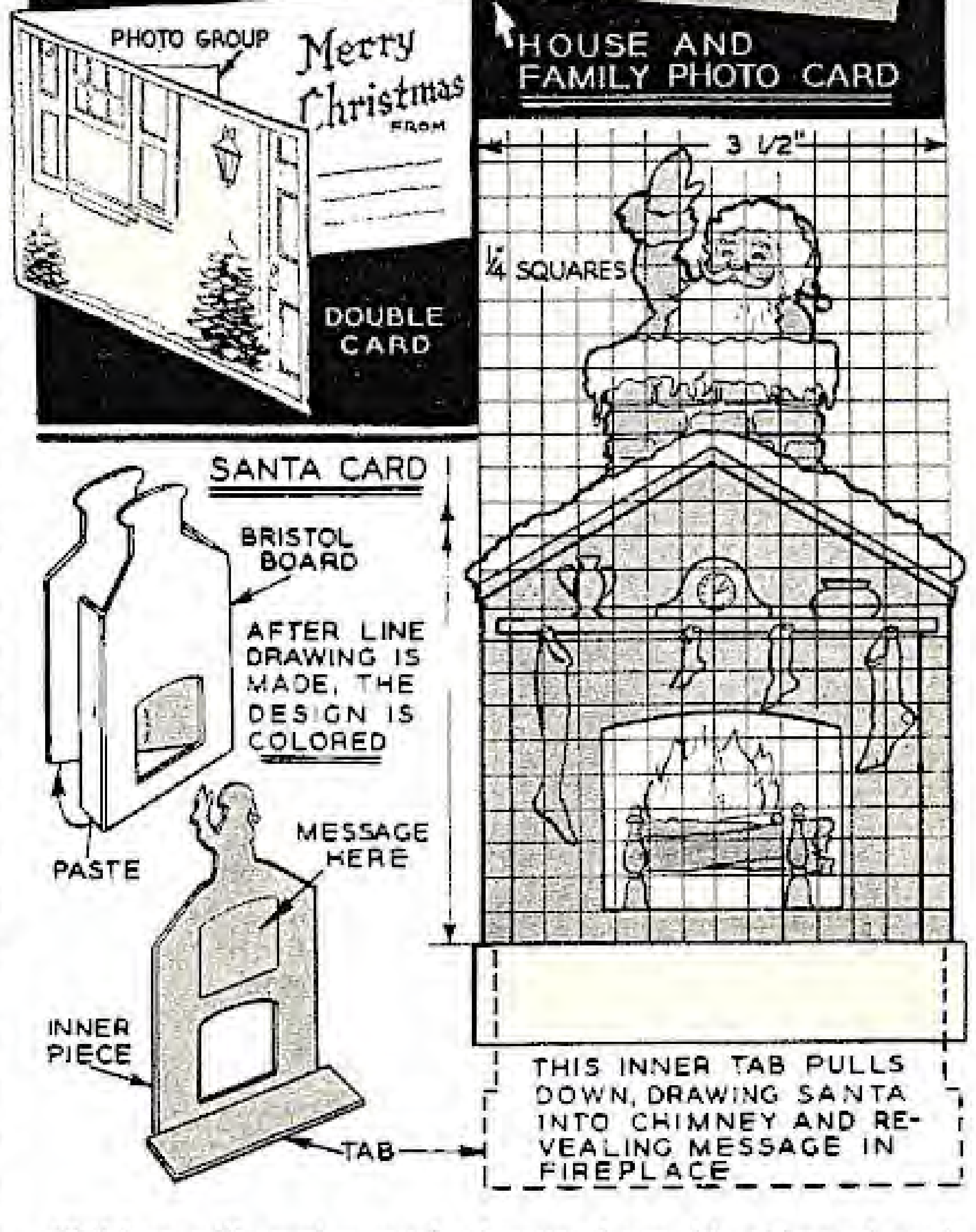
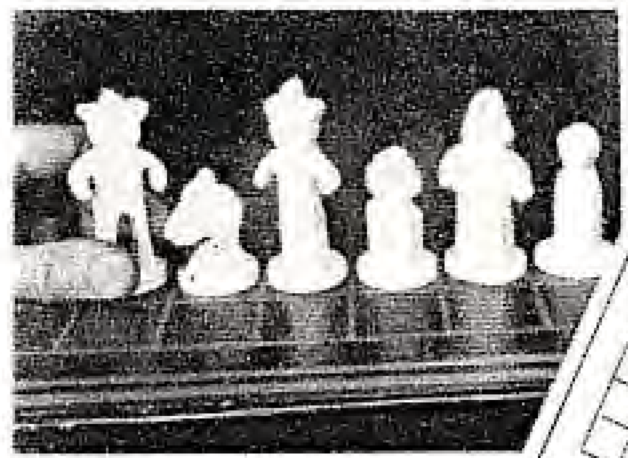


PHOTO GROUP
Merry Christmas FROM
DOUBLE CARD
HOUSE AND FAMILY PHOTO CARD
3 1/2"
1/4 SQUARES
SANTA CARD
BRISTOL BOARD
AFTER LINE DRAWING IS MADE, THE DESIGN IS COLORED
PASTE
MESSAGE HERE
INNER PIECE
TAB
THIS INNER TAB PULLS DOWN, DRAWING SANTA INTO CHIMNEY AND REVEALING MESSAGE IN FIREPLACE

Children will receive much pleasure from this animated card. When the tab at bottom of the card is pulled Santa slides down the chimney and a greeting appears in the fireplace opening

Simple GIFT Projects For Junior Craftsmen



Above—Set of men as used in playing chess, made as described here.

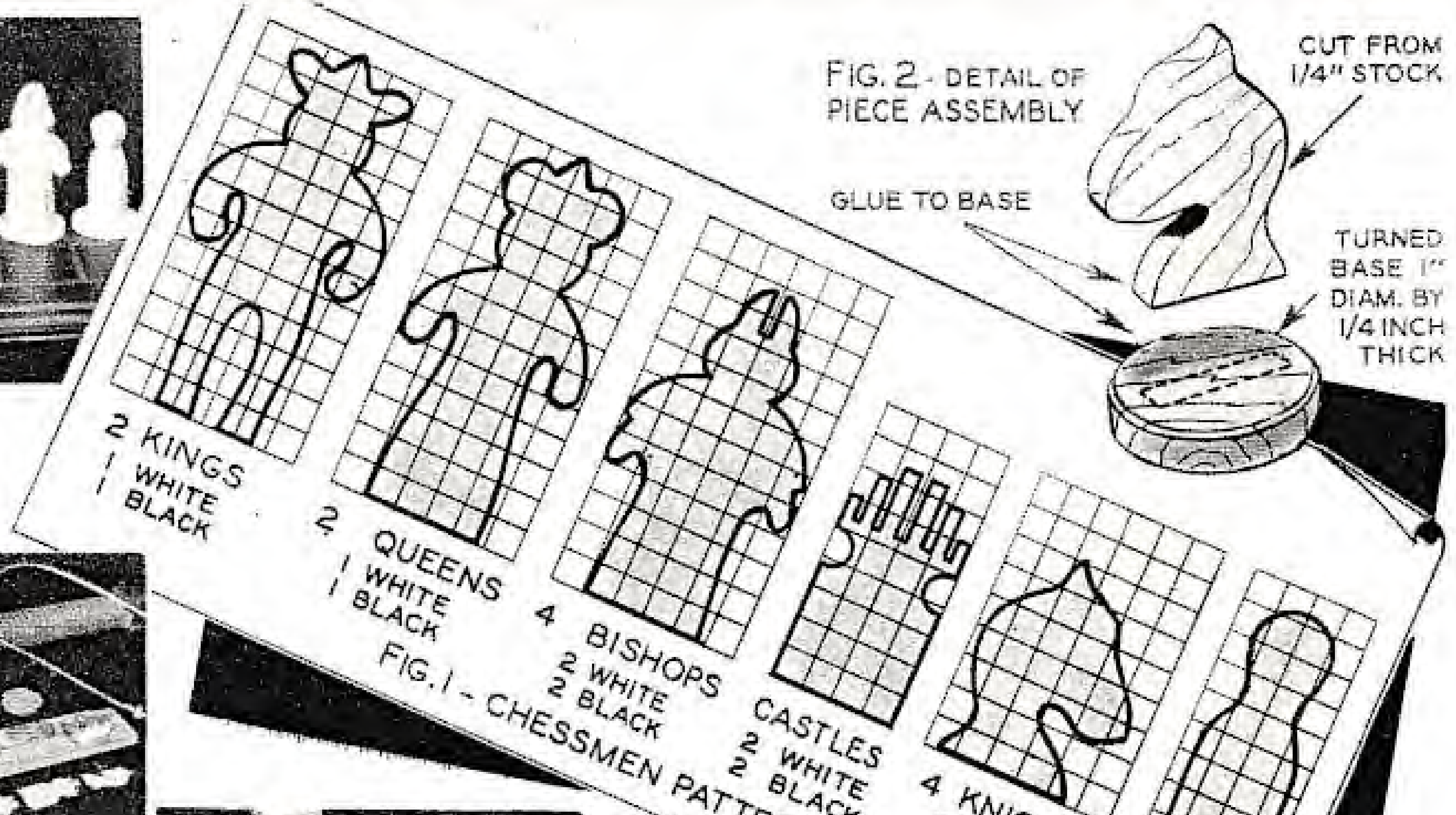
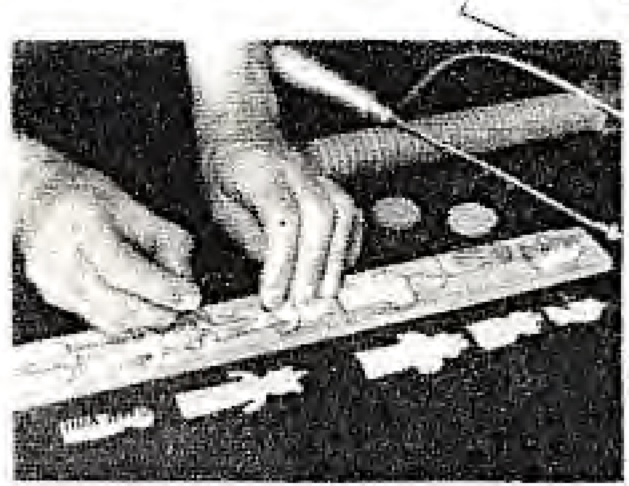

CUT FROM 1/4" STOCK
GLUE TO BASE
TURNED BASE 1" DIAM. BY 1/4 INCH THICK
2 KINGS 1 WHITE 1 BLACK
2 QUEENS 1 WHITE 1 BLACK
4 BISHOPS 2 WHITE 2 BLACK
CASTLES 2 WHITE 2 BLACK
4 KNIGHTS 2 WHITE 2 BLACK
PAWNS 8 WHITE 8 BLACK

FIG. 2 - DETAIL OF PIECE ASSEMBLY

FIG. 1 - CHESSMEN PATTERNS (1/4" SQUARES)

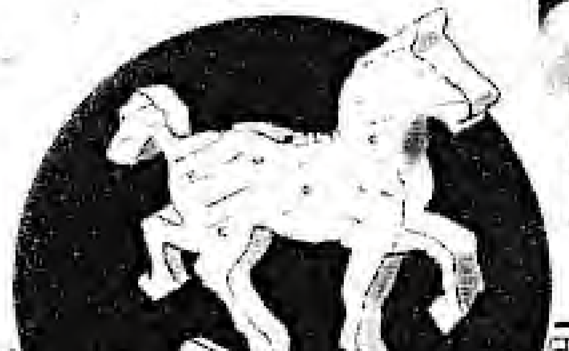
Make full size patterns on heavy paper from the plans shown above.



Transfer the paper patterns onto strips of pine lattice as shown in the photo above.

Cutting the pieces out on a jig saw. Note that a number of strips are cut together.

Above and at right—Two steps in forming the base discs. Use a pair of calipers to measure and mark the width of each disc and partly cut while in lathe.



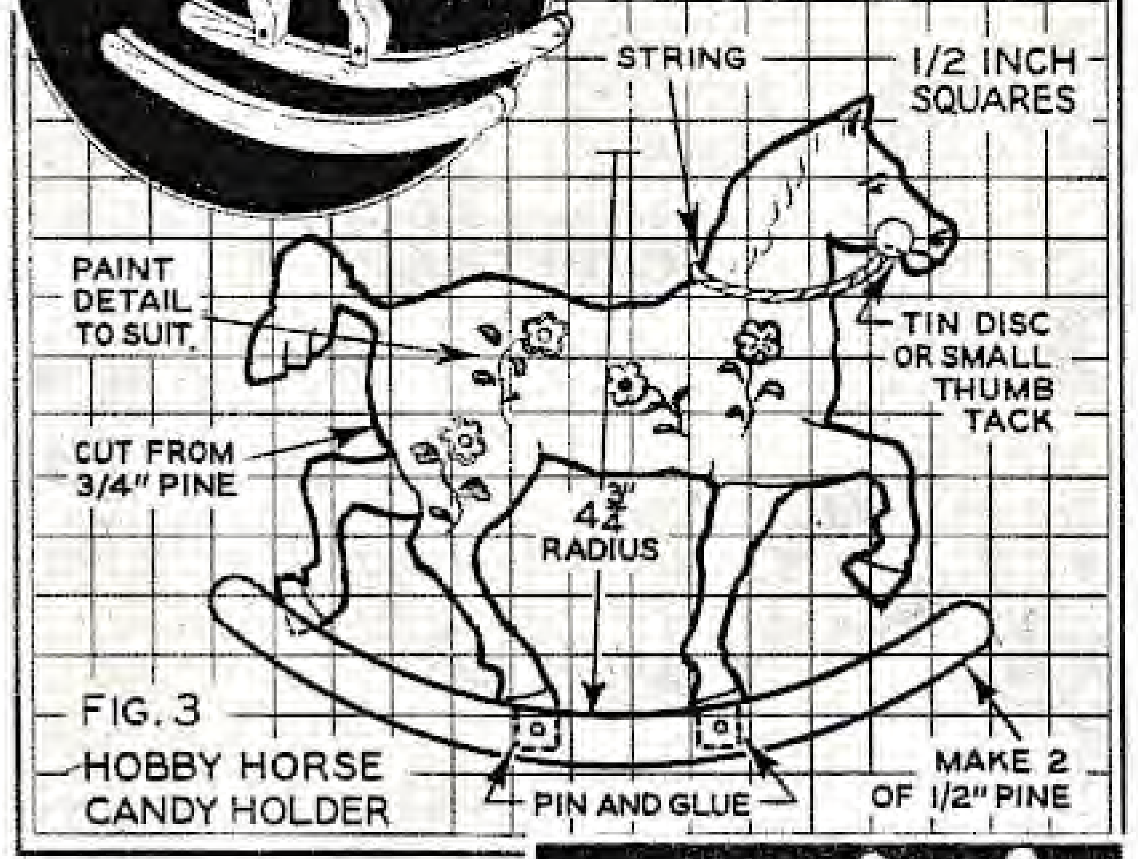
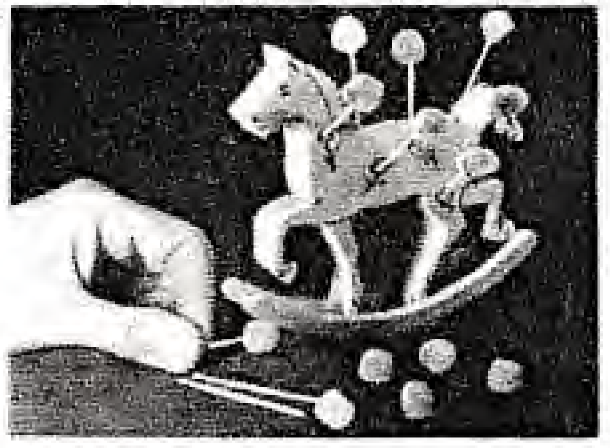

STRING
1/2 INCH SQUARES
PAINT DETAIL TO SUIT
TIN DISC OR SMALL THUMB TACK
CUT FROM 3/4" PINE
4¾" RADIUS
PIN AND GLUE
MAKE 2 OF 1/2" PINE

FIG. 3 HOBBY HORSE CANDY HOLDER



The novelty hobby horse for candy or appetizers can also be made for use as a simple toy. Use the above plan to make a full size pattern of the horse, cutting out the various parts so that they appear as shown in the small upper sketch. Punch a few small holes for toothpicks.

by RAY J. MARRAN

HERE is a group of interesting projects which were designed especially for the young shopman. Although simple to make they will be more than appreciated by the friends who receive them this Christmas for gifts. Only simple shop machinery is required to make them and when attractively painted in modern enamels or lacquers they will be on an equal plane with manufactured articles of similar design.

A power jig-saw and moderate wood turning lathe are the only machines required in cutting out the various projects. The construction work is extremely simple in all instances, but this does not mean that the articles should be cut out hurriedly. Care will result in neat gifts that you can be proud of.

While chessmen are usually turned on a lathe from hardwood, they are too common in design to command any unusual attention. Therefore, a set of distinct design was chosen which could be cut out on a power jig-saw. The complete set consists of thirty-two pieces, sixteen white and sixteen black or red. Cut out from plywood, according to the patterns shown in the accompanying drawings, two kings, two

[Continued on page 132]

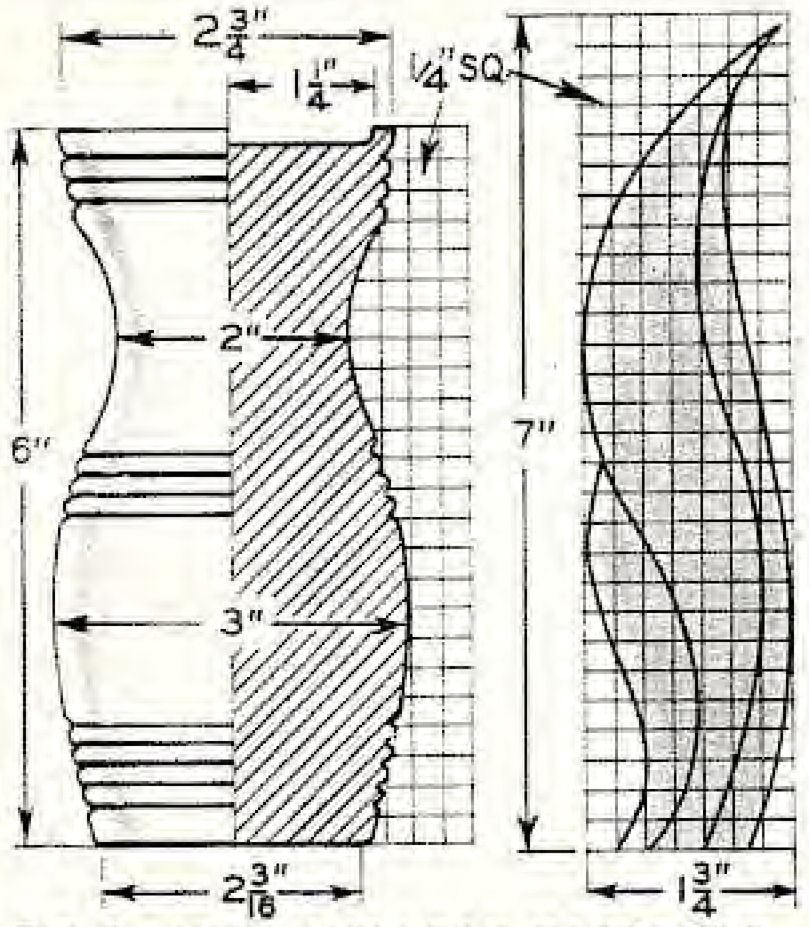

2¾"
1¼"
¼" SQ.
2"
6"
7"
3"
2 3/16"
1¾"

FIG. 5 – VASE AND LEAF PATTERNS

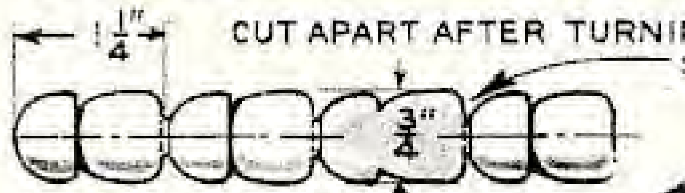
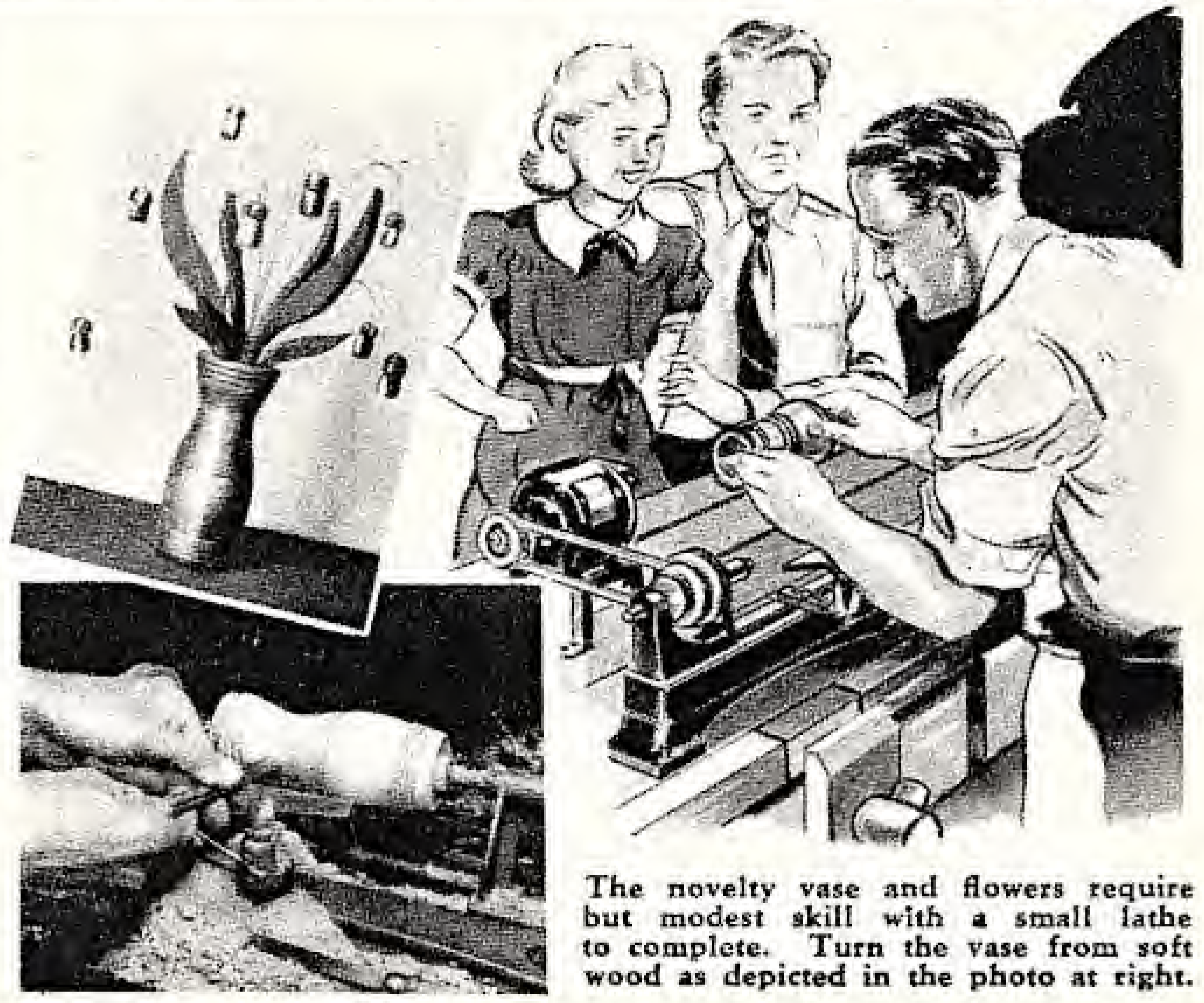
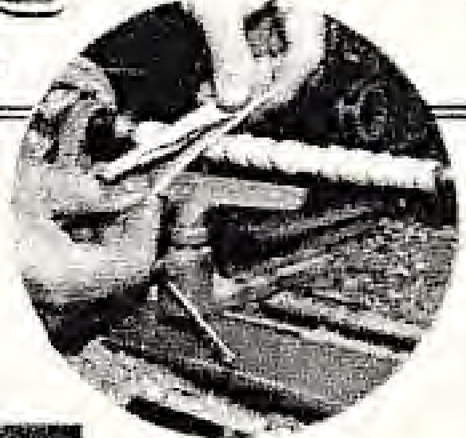

1¼"
CUT APART AFTER TURNING TO SHAPE
¾"

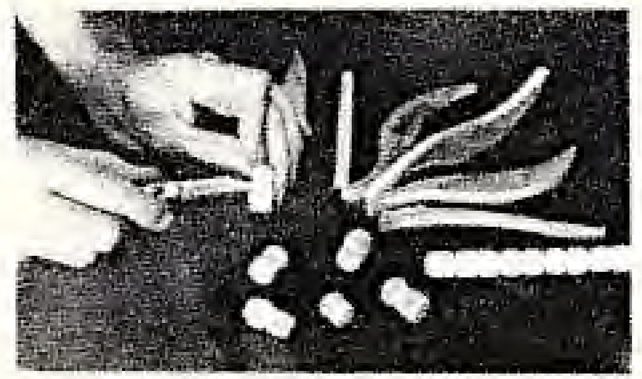
FIG. 6 – FLOWER PATTERN

Use the above patterns for the lathe work and enlarge the leaf pattern to full size before attempting to cut out these parts, using the ½" squares to duplicate the plan.



The novelty vase and flowers require but modest skill with a small lathe to complete. Turn the vase from soft wood as depicted in the photo at right.





Above — Shaping and smoothing the buds on a lathe. Left — Notching the buds with a knife to represent petals. Attach to vase with fine wire.

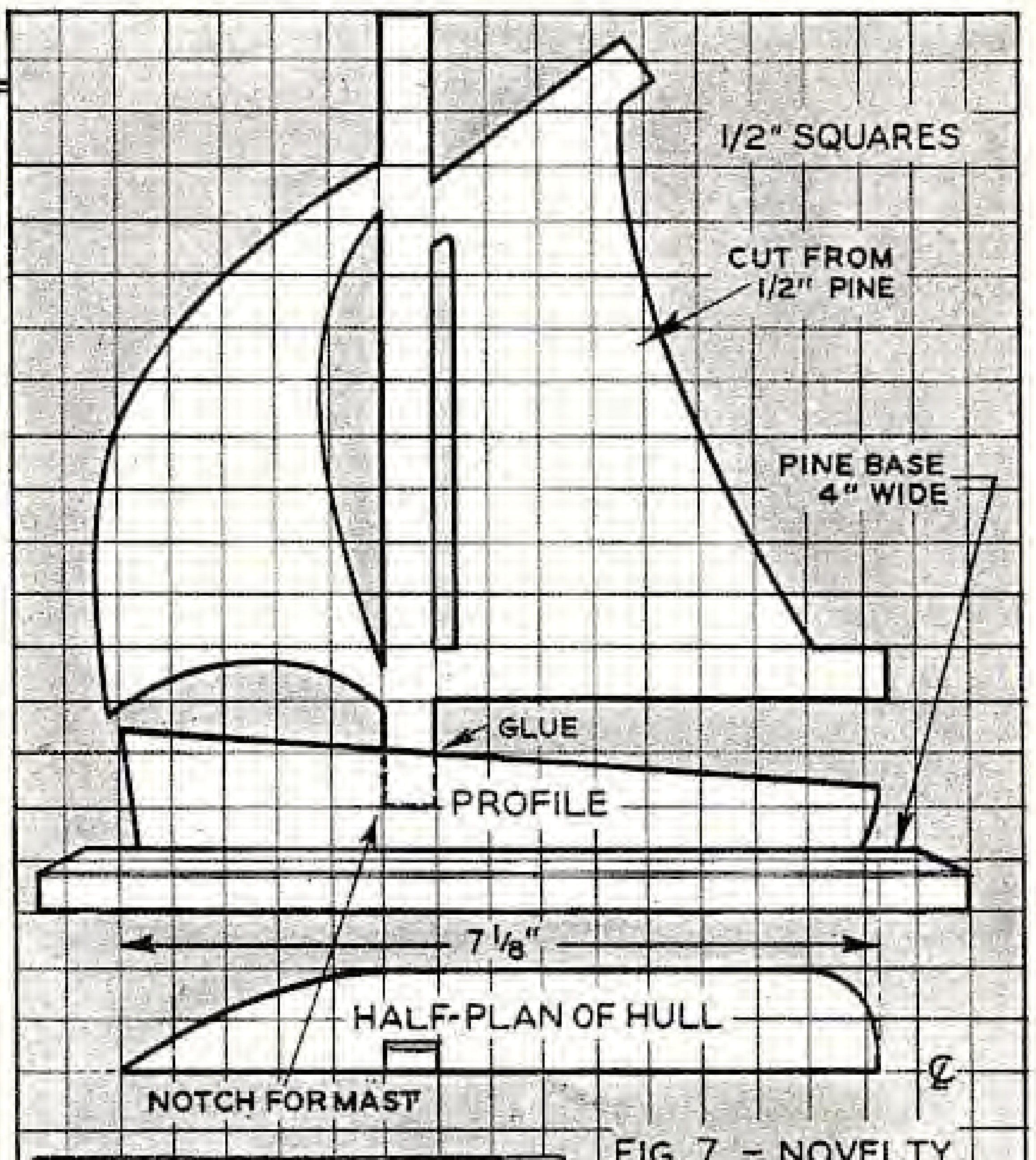
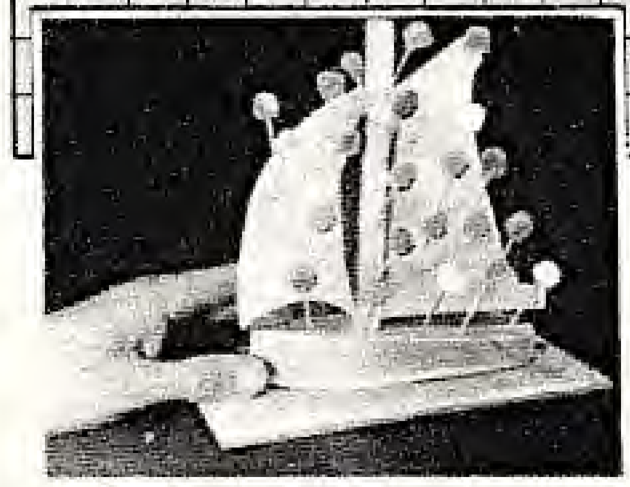
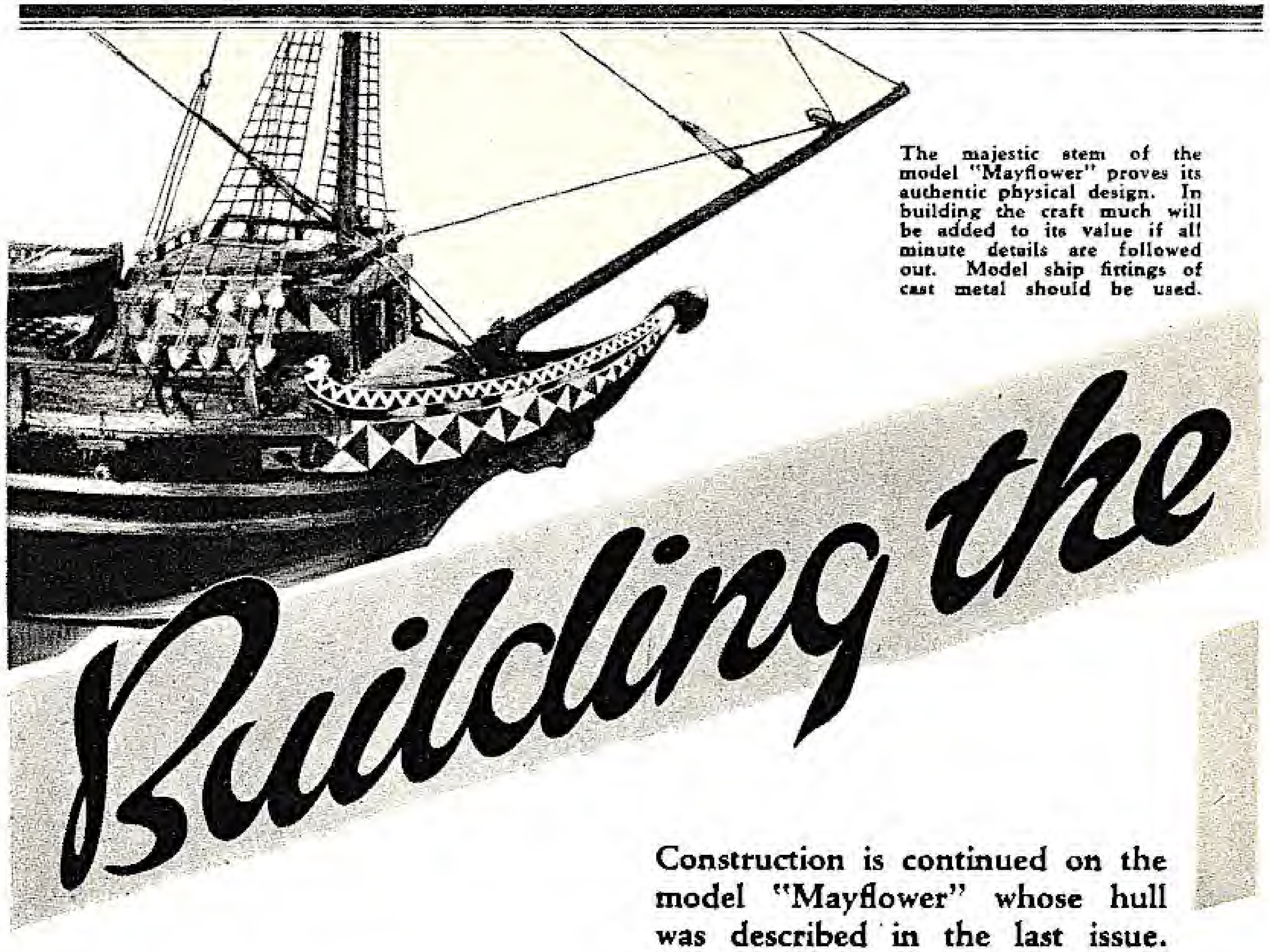

1/2" SQUARES
CUT FROM 1/2" PINE
PINE BASE 4" WIDE
GLUE
PROFILE
7 1/8"
HALF-PLAN OF HULL
NOTCH FOR MAST
℄

FIG. 7 - NOVELTY SHIP HOLDER FOR HORS - D'OEUVRES



The novelty ship candy or appetizer holder shown at left is the simplest of all these easily built novelties. Cut out the hull block to above plans and glue it to wooden base as shown. Cut mast and sails in one piece.

Building the Model Mayflower



The majestic stem of the model "Mayflower" proves its authentic physical design. In building the craft much will be added to its value if all minute details are followed out. Model ship fittings of cast metal should be used.

Construction is continued on the model "Mayflower" whose hull was described in the last issue. With this installment the attractive little ship begins to take shape.

PART II

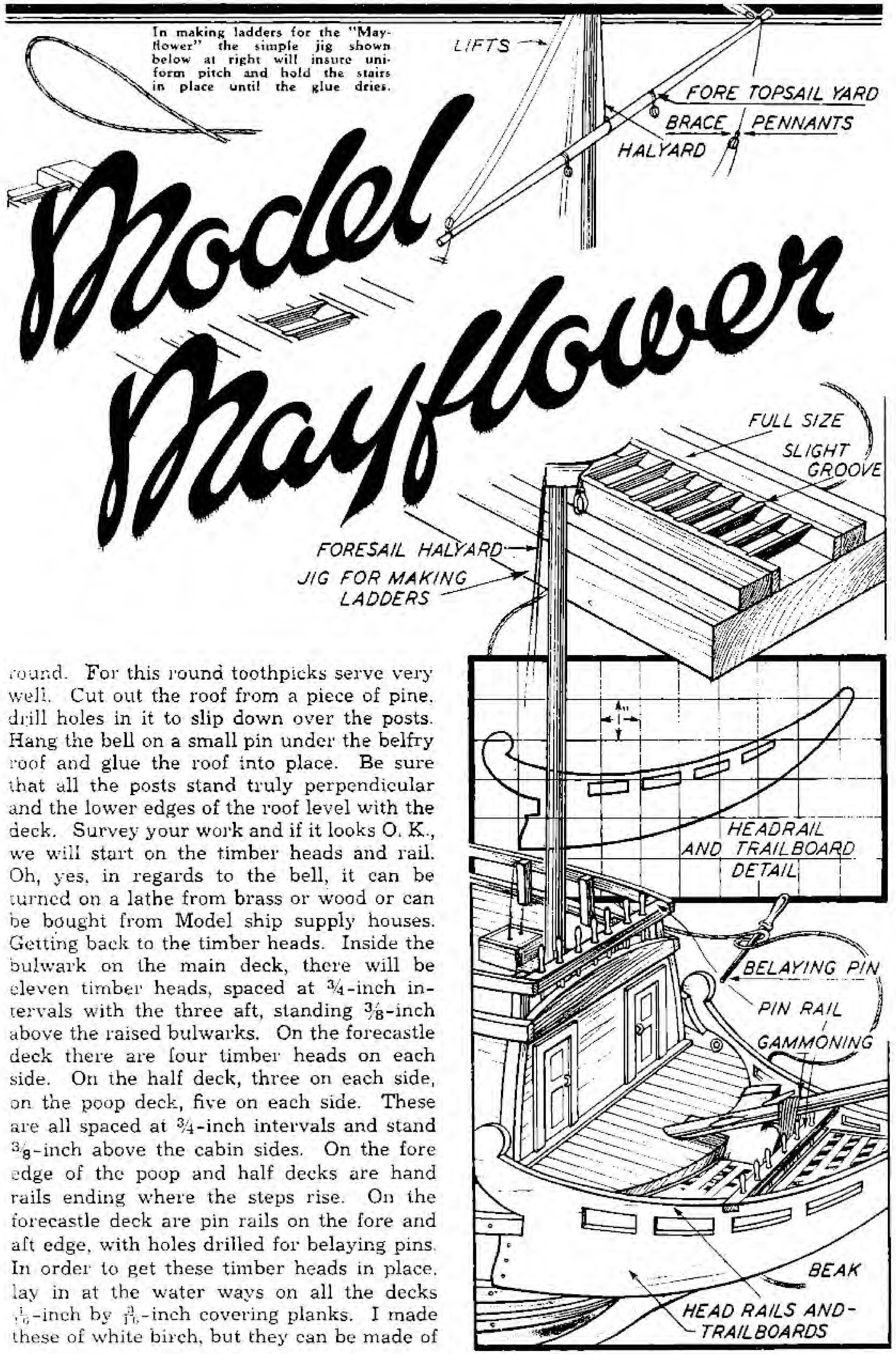
by ERLING W. EKLOF

BUILDING an authentic scale model of the famous ship, "Mayflower," has been the ambition of many craftsmen and hobbyists, but due to lack of authoritative plans their ambition has never been realized. While not difficult to construct such a model, nevertheless, requires basic plans before it can be attempted by the average craftsman. Here is a model that will command the undivided attention of your friends and will mark you as a more than ordinary modelmaker.

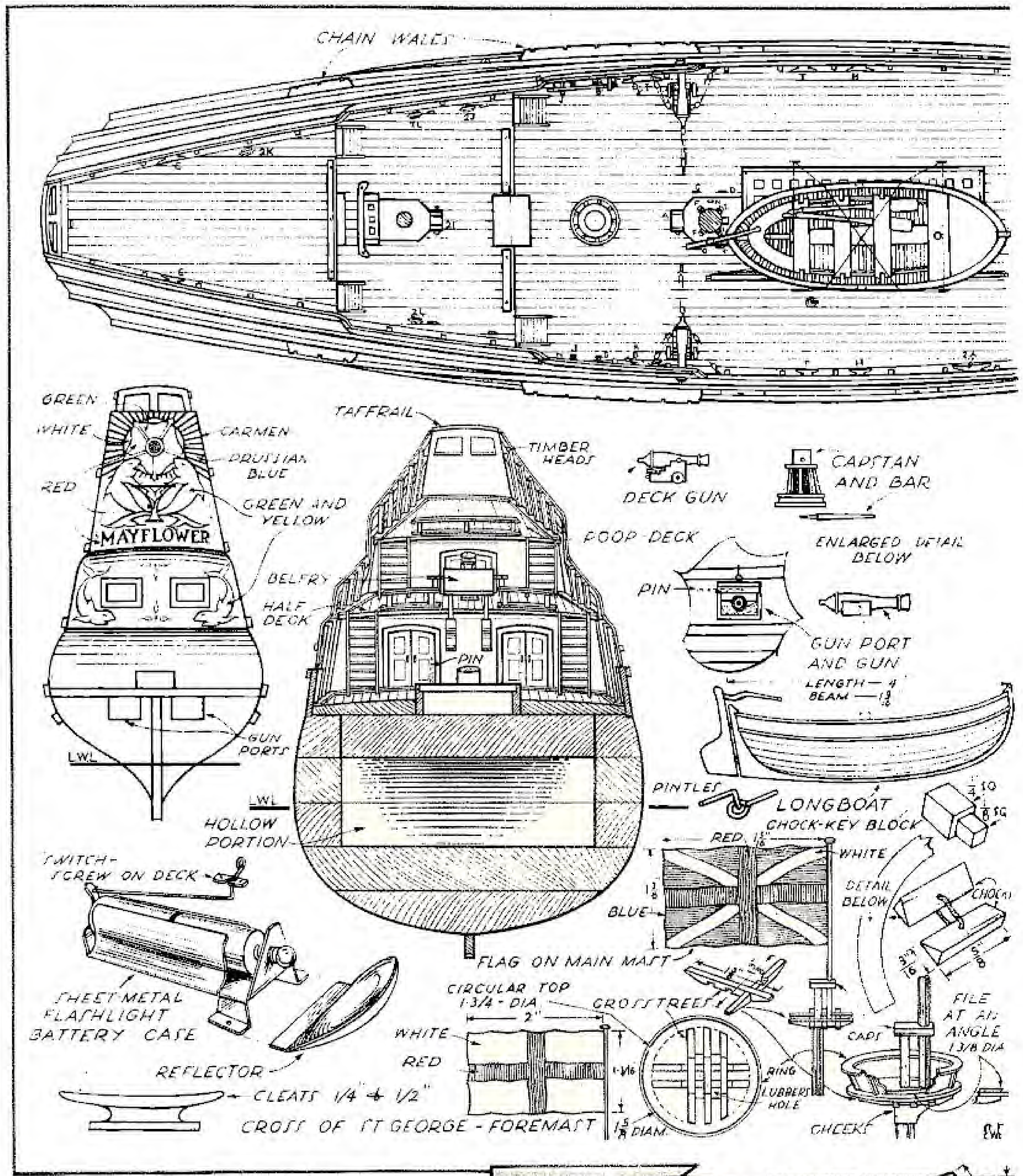
Following as closely as historical data would permit the model is built to the scale of $\frac{3}{16}$-inch to 1-foot making it ideal in size for a fireplace or table decoration. The hull is carved first, as was described in the first installment which appeared in the November issue, after which the deck grill, cabin and other incidentals were installed.

The head rails and trail boards are next. These are fashioned in one piece, nailed and glued to the hull at the forward end of the bulwarks. The forward end of the trail board is fastened to the beak of the cut-water. The exact position can be seen on the drawing. Extending horizontally between the trail board in the direction of the beam, is a timber to hold the gratings. The gratings may be punched out of fibre, board, or thin three-ply wood.

A better way is to make them out of strips of pine, a shade under ⅛-inch by $\frac{3}{16}$-inch. In other words, the same method as was outlined for the main hatch. This may entail a bit more work, but is much more satisfactory when finished. After you have laid up and glued a portion of hatch work. 2¾ inches wide by 4 inches long, let dry and then sandpaper. Then saw out the shape of the three gratings with a fine scroll saw and glue fine strips along the sawed edges. Where it is curved, soak the strip in boiling water to make easier its gluing into position. Refer to the plan for the shape of these gratings. Make the partners for the mast and knightheads as illustrated. You should get a kick out of making the Belfry. Fashion the brackets first, nail and glue these into place between the doors under the overhang of the half deck. Use fine brads for this. Drill holes to take the supporting posts which are round. For this round toothpicks serve very well. Cut out the roof from a piece of pine, drill holes in it to slip down over the posts. Hang the bell on a small pin under the belfry roof and glue the roof into place. Be sure that all the posts stand truly perpendicular and the lower edges of the roof level with the deck. Survey your work and if it looks O. K., we will start on the timber heads and rail. Oh, yes, in regards to the bell, it can be turned on a lathe from brass or wood or can be bought from Model ship supply houses. Getting back to the timber heads. Inside the bulwark on the main deck, there will be eleven timber heads, spaced at ¾-inch intervals with the three aft, standing ⅜-inch above the raised bulwarks. On the forecastle deck there are four timber heads on each side. On the half deck, three on each side, on the poop deck, five on each side. These are all spaced at ¾-inch intervals and stand ⅜-inch above the cabin sides. On the fore edge of the poop and half decks are hand rails ending where the steps rise. On the forecastle deck are pin rails on the fore and aft edge, with holes drilled for belaying pins. In order to get these timber heads in place, lay in at the water ways on all the decks $\frac{1}{16}$-inch by $\frac{3}{16}$-inch covering planks. I made these of white birch, but they can be made of



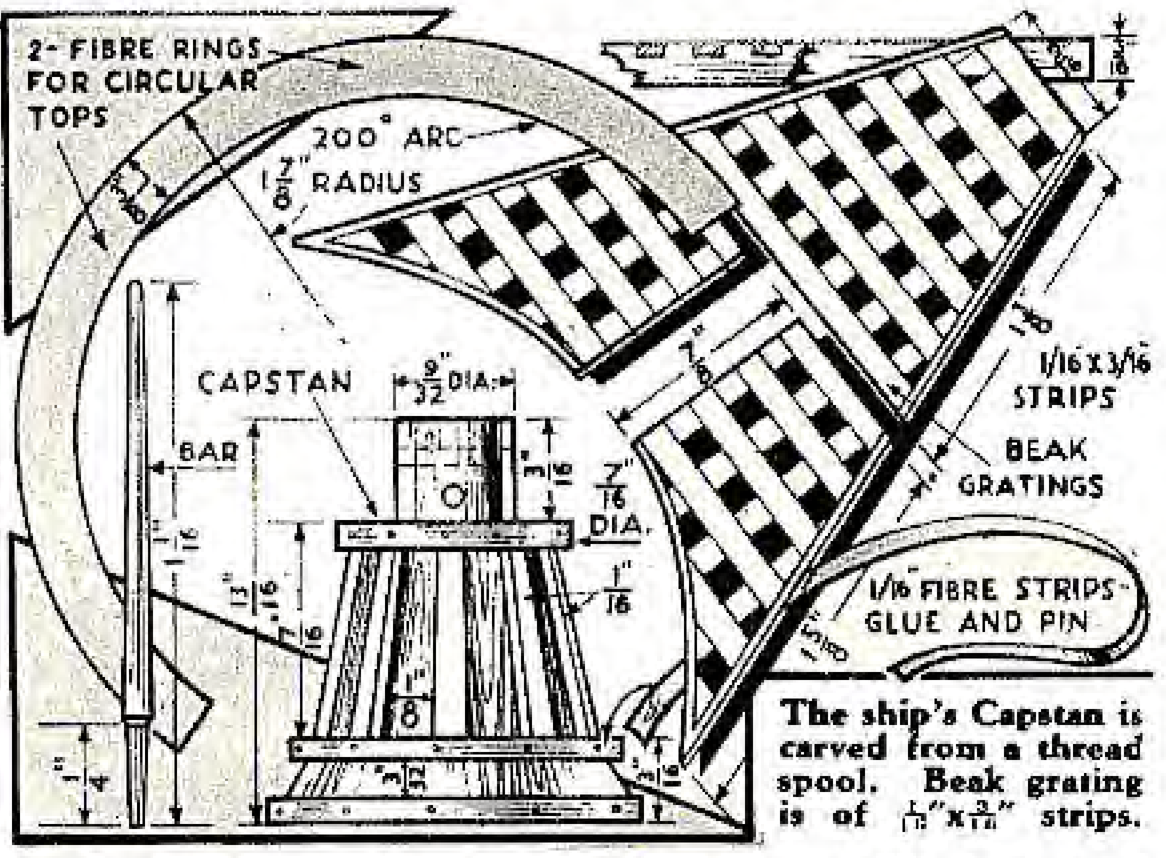
In making ladders for the "Mayflower" the simple jig shown below at right will insure uniform pitch and hold the stairs in place until the glue dries.


CHAIN WALES
GREEN
WHITE
CARMEN
PRUSSIAN BLUE
RED
GREEN AND YELLOW
MAYFLOWER
BELFRY
HALF DECK
GUN PORTS
LWL
TAFFRAIL
TIMBER HEADS
POOP DECK
PIN
HOLLOW PORTION
DECK GUN
CAPSTAN AND BAR
ENLARGED DETAIL BELOW
GUN PORT AND GUN
LENGTH — 4"
BEAM — 1 3/4
PINTLES
LONGBOAT
CHOCK-KEY BLOCK
RED
WHITE
BLUE
FLAG ON MAIN MAST
DETAIL BELOW
CHOCK
SWITCH-SCREW ON DECK
SHEET METAL FLASHLIGHT BATTERY CASE
REFLECTOR
CLEATS 1/4 & 1/2"
CIRCULAR TOP 1-3/4 DIA
2"
CROSSTREES
WHITE
RED
CROSS OF ST GEORGE - FOREMAST
RING
LUBBERS HOLE
CAPS
FILE AT AN ANGLE
1 3/8 DIA
CHEEKS
1 5/8 DIAM.

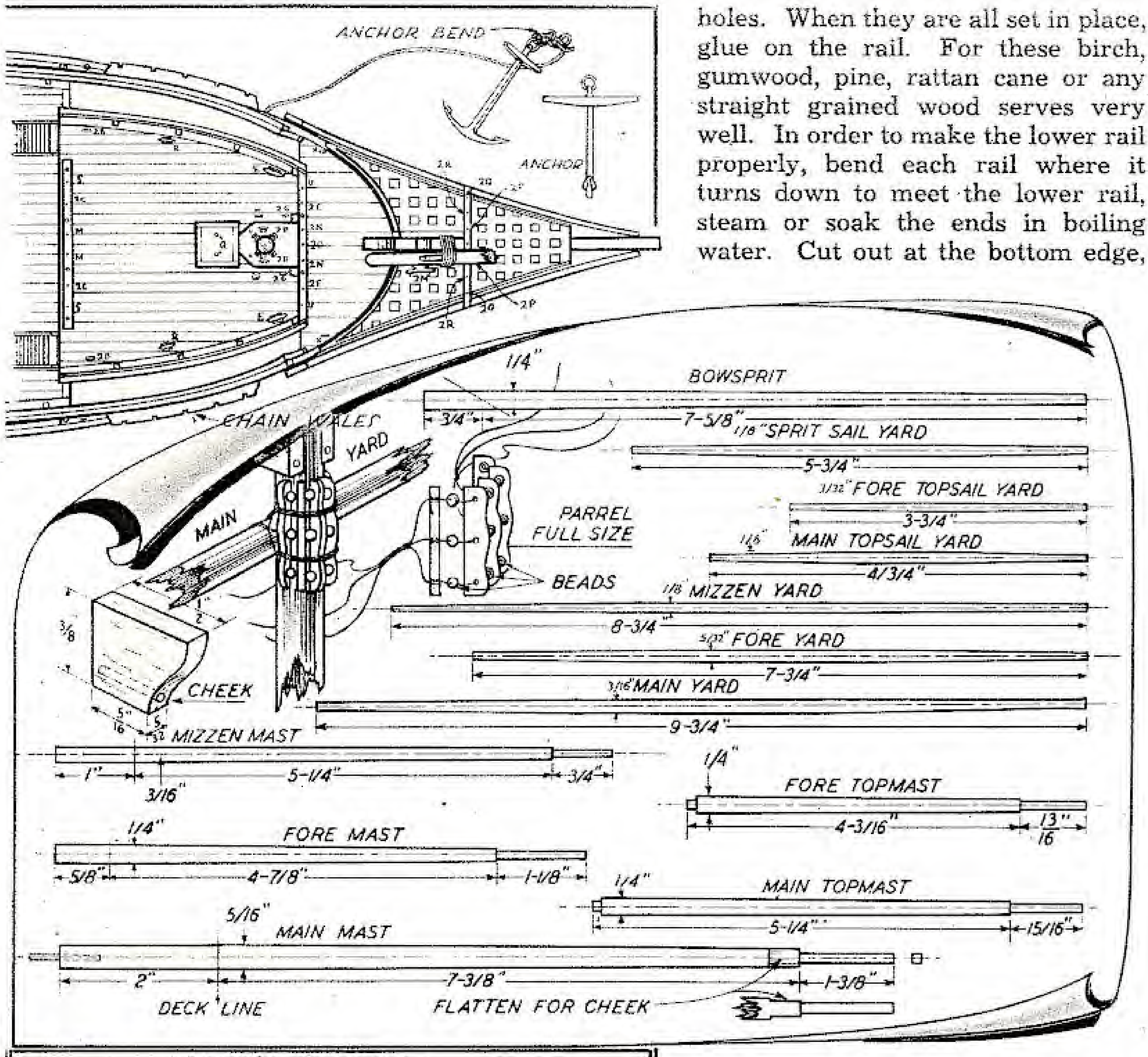
Arrangement of the "Mayflower" deck fixtures is shown in the above diagram. A sheet metal battery box provided with a bulb and reflector will illuminate the ship through the deck grating if mounted in the hollow portion of the hull. Paint ship as indicated.

pine. Nail and glue them. Birch makes good timber heads and posts. They should be $\frac{3}{32}$-inch square, their lower ends sunk through the covering boards and into the deck. They stand perpendicular to the water line, but slant slightly inward the same as the cabin sides. To sink them, drill holes the same diameter as their width. Round the lower end about ¼-inch and glue into the holes. When they are all set in place, glue on the rail. For these birch, gumwood, pine, rattan cane or any straight grained wood serves very well. In order to make the lower rail properly, bend each rail where it turns down to meet the lower rail, steam or soak the ends in boiling water. Cut out at the bottom edge, at the point of the bend, a small triangular piece. Now glue into place. To facilitate the gluing process, spring clothes pins serve as good clamps to hold the rails in place. Otherwise, they can be tied with thread, it being removed later. Cut the hand rails and pin rails on the half, poop, and forecastle decks. Set on top of the posts in same manner as the belfry roof was fastened. There is also a fife rail behind the hatch, aft of the mizzen mast. This takes care of all the rails. If you are new at model making, you may look at the ladders with doubt, but don't worry, they're easy.

First, cut the side pieces, about the same size you made the railings. The


2-FIBRE RINGS FOR CIRCULAR TOPS
200° ARC
1 7/8" RADIUS
CAPSTAN
9/32 DIA.
BAR
7/16 DIA.
1/16"x1/16" STRIPS
BEAK GRATINGS
1/16 FIBRE STRIPS GLUE AND PIN

The ship's Capstan is carved from a thread spool. Beak grating is of $\frac{1}{32}$"x$\frac{3}{32}$" strips.

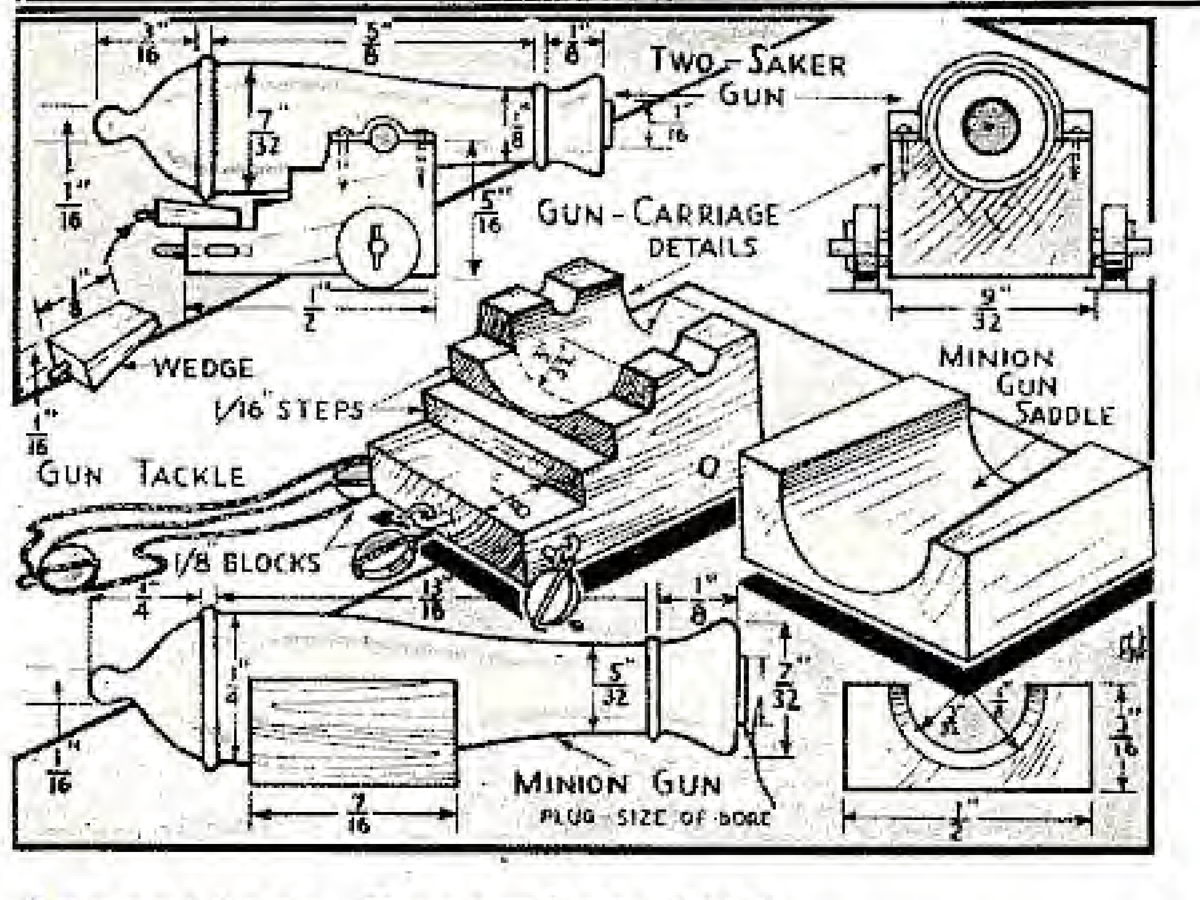

ANCHOR BEND
ANCHOR
CHAIN WALES
BOWSPRIT
1/4"
3/4"
7-5/8"
1/8" SPRIT SAIL YARD
5-3/4"
3/32" FORE TOPSAIL YARD
3-3/4"
1/8" MAIN TOPSAIL YARD
4/3/4"
1/8" MIZZEN YARD
8-3/4"
5/32" FORE YARD
7-3/4"
3/16" MAIN YARD
9-3/4"
YARD
MAIN
PARREL FULL SIZE
BEADS
CHEEK
MIZZEN MAST
1"
5-1/4"
3/4"
3/16"
FORE TOPMAST
4-3/16"
13/16"
FORE MAST
5/8"
4-7/8"
1-1/8"
MAIN TOPMAST
5-1/4"
15/16"
5/16"
MAIN MAST
2"
7-3/8"
1-3/8"
DECK LINE
FLATTEN FOR CHEEK

Dimensions for all masts and halyards appear here. Birch dowels are reccommended for making these as they are less apt to snap off. Rigging designations appear at left. Minion and Two-Saker guns are hardwood, turned.

RIGGING DESIGNATIONS

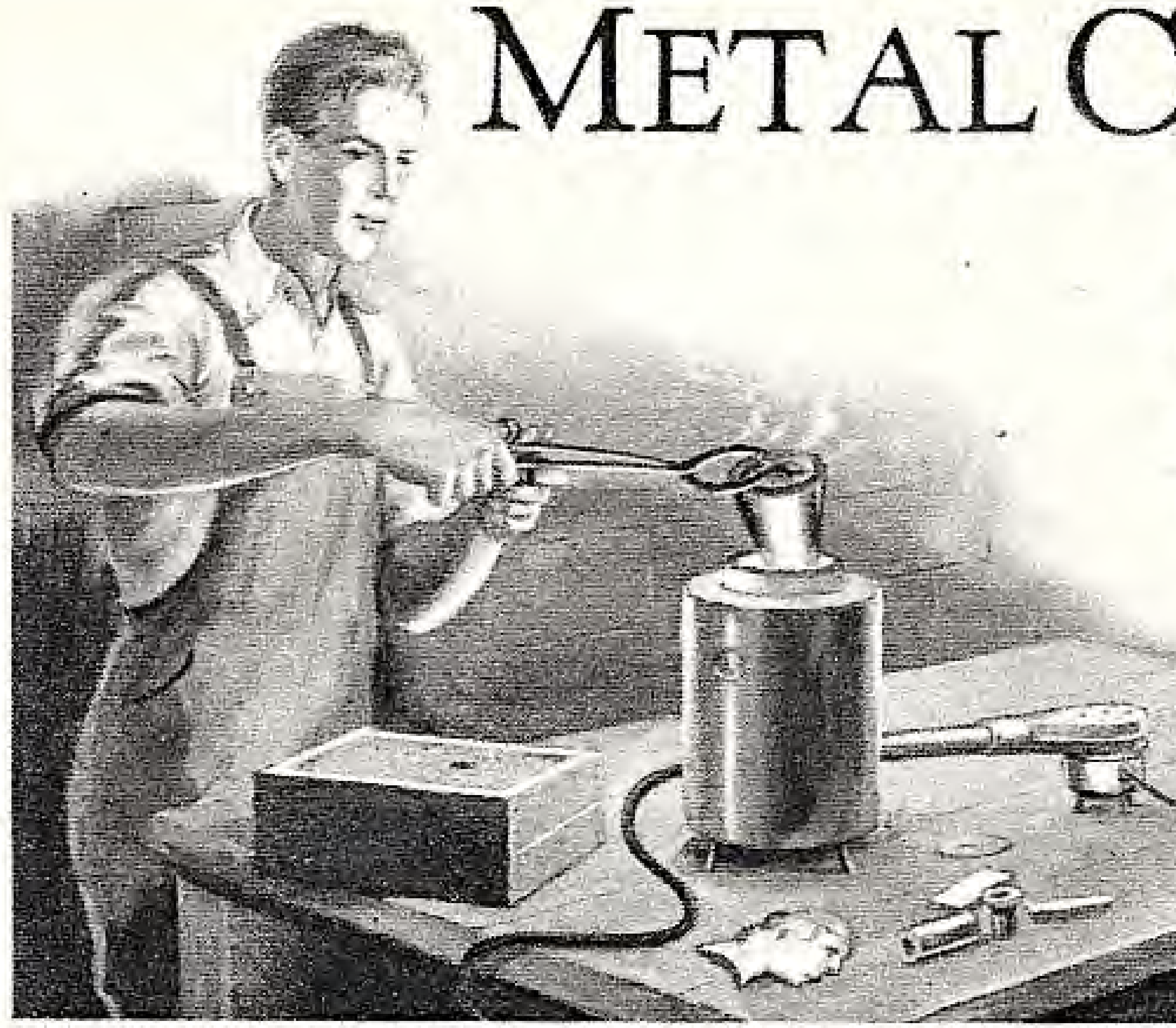
A	MAIN-SAIL HALYARD
B	" " LIFTS
C	" " BRACES
D	" " SHEETS
E	" " BOWLINES
F	" " CLEWLINES
G	" " BUNTLINES
H	" " TACKS
I	MAIN-TOPSAIL HALYARD
J	" " LIFTS
K	" " BRACES
L	" " SHEETS
M	" " BOWLINES
N	MAIN-TOPSAIL CLEWLINE
O	" " BUNTLINES
Q	FORE SAIL HALYARD
R	" " LIFTS
S	" " BRACES
T	" " SHEETS
U	" " BOWLINES
V	" " CLEWLINES
W	" " BUNTLINES
X	" " TACKS
2A	FORE-TOPSAIL HALYARD
2B	" " LIFTS
2C	FORE-TOPSAIL BRACES
2D	" " SHEETS
2E	" " BOWLINES
2F	" " CLEWLINES
2G	" " BUNTLINES
2I	MIZZEN - HALYARD
2J	" LIFTS
2K	" SHEETS
2L	" TACKS

SPRITSAIL on PLATE THREE


TWO-SAKER GUN
GUN-CARRIAGE DETAILS
WEDGE
1/16" STEPS
GUN TACKLE
1/8 BLOCKS
MINION GUN SADDLE
MINION GUN
PLUG - SIZE OF BORE
9/32
5/8
1/8
7/32
3/16

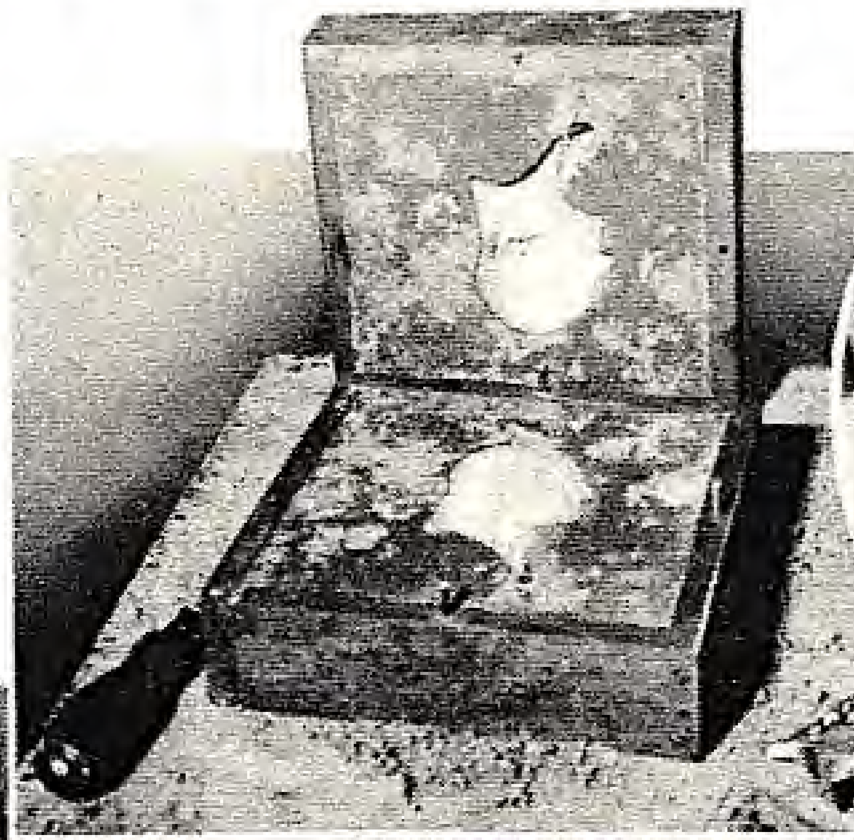
METAL CASTING IN ALUMINUM AND BRONZE

Casting small machine parts, plaques and other articles in the basement workshop is easy. A simple blast furnace and scrap metal is all you need to start.

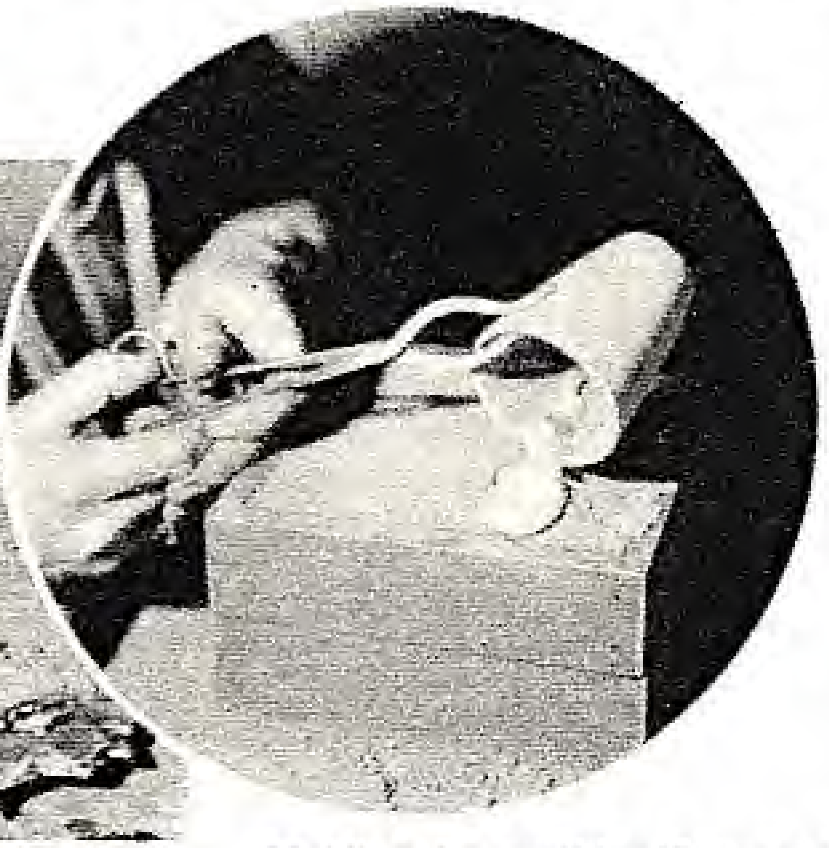


Before making the sand mold, carefully sift the finest sand obtainable through a screen as shown above, then moisten it and pack it firmly into the frame or flask in the manner as described at right. Sand should be moist—not wet.

After packing the sand in the frame press the plaster plaque in place and powder both it and surrounding sand with fine powdered graphite.

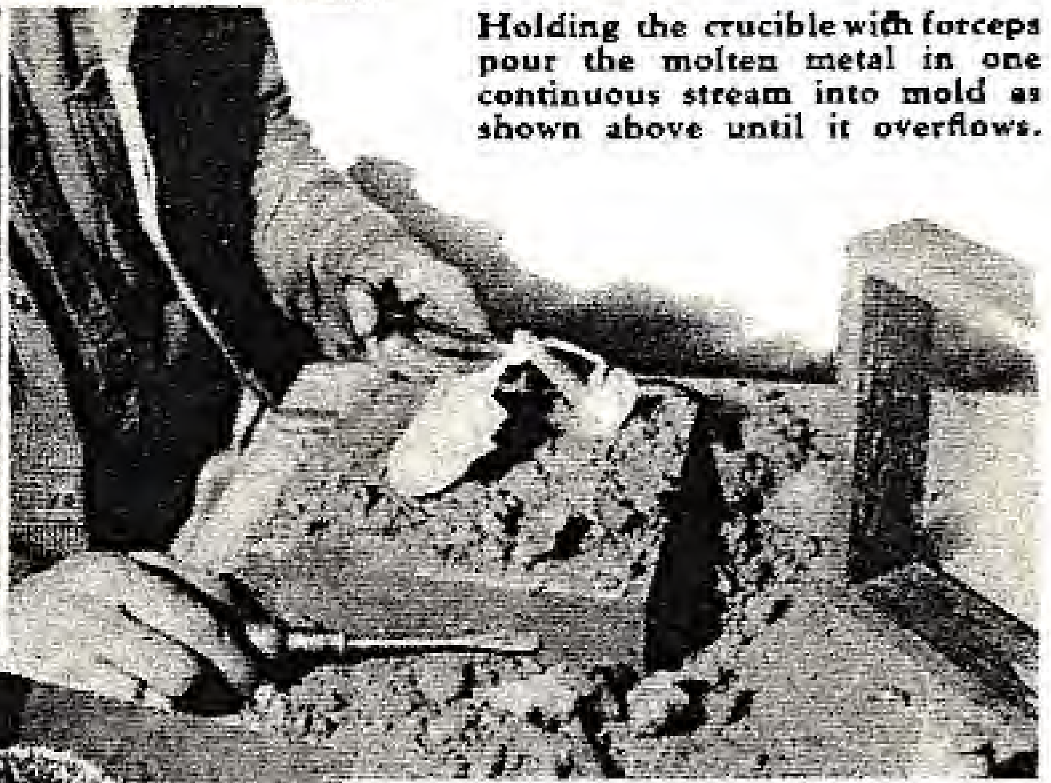


Completing the graphite powdering, place the upper frame over lower and pack it with sand. Frames are carefully separated and plaque removed as shown at right.

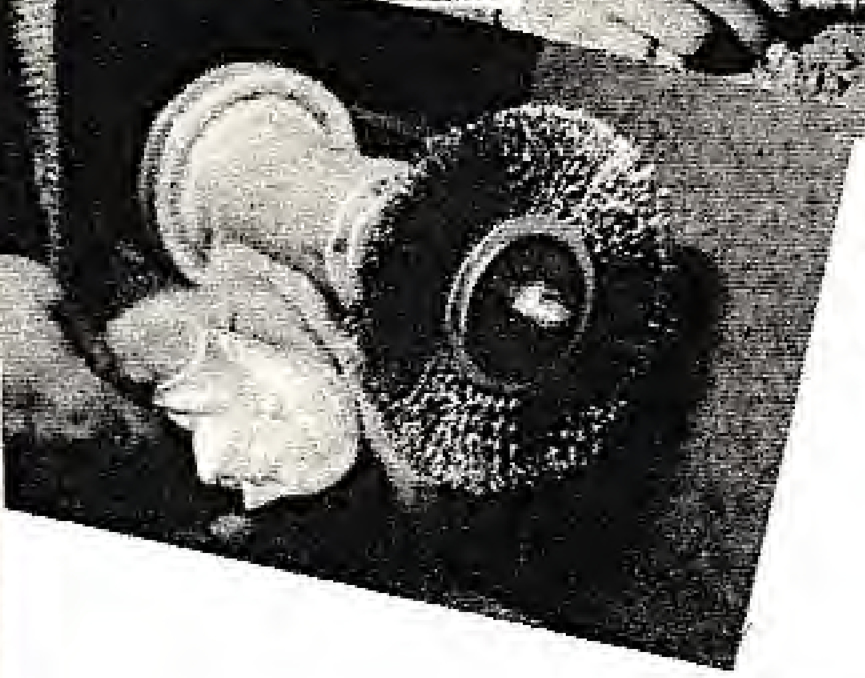


Holding the crucible with forceps pour the molten metal in one continuous stream into mold as shown above until it overflows.

In order to pour the metal into the mold a well is required. Wood dowel provides this.



After the metal has been allowed to cool, the sand mold is broken apart and the rough casting removed. Above is shown the casting before surplus metal was cut off. This is done with a back saw and several sizes of files.



After the casting has hardened it is removed, rough parts filed down and the surface is polished on a buffing wheel.

THOUGHT too difficult for shop production the interesting art of metal casting has been passed up by many shopmen and home craftsmen who did not realize that this craft was really simple after its procedure had been studied. Using any of the popular soft metals and plaster of Paris wall plaques such as sold in ten-cent stores anyone, with a little practice, can make perfect reproductions of these articles in bronze or aluminum. The finished articles make attractive gifts as well as decorations for use in your own home. Small parts for models, machine bushings and light hardware can also be duplicated in the home workshop at a fraction of their usual cost with this apparatus.

A miniature blast furnace well suited for home shop use can be purchased for less than twenty dollars. Operated by a light electric powered blower and a gas flame the furnace will handle up to six cubic inches of molten metal. It is unnecessary to use new metal for casting light articles since scrap metal melted over is just as good and costs only about ten cents a pound from junk dealers.

After completing your furnace set-up preparation of the molds can be undertaken. These are made from very fine sand which has been screened to remove all lumps, then moistened with water and mixed with a trowel until when squeezed in the fingers the fingerprints show in the sand. Pack the moist sand into the flask taking care that the sand is packed well in all corners. The flask is a pair of box-like frames which rest one on top of the other with small dowel pins provided so that they register properly. Grooves cut inside the frame prevent the sand from dropping out once it has been packed in. The accompanying illustrations show the simplicity of their construction.

With the sand packed in one frame or flask the pattern is ready for impression. In this case a plaque of George Washington was selected and placed face up in the center of the sand mold. Next press the plaque firmly into the sand until all edges touch evenly. Sprinkle powdered graphite or talcum powder over both the surface of the sand and plaster plaque wiping off carefully all surplus.

The top half of the frame or flask is then put into place and sand sprinkled lightly over the graphited surface by passing it through a

[*Continued on page* 122]

Engineering Features In 1937 Autos

[*Continued from page* 45]

bigger Buick engine has been increased from 120 to 130. Specifications are: valve-in-head, 8 cylinders in line, $3\frac{7}{16}''$ bore by $4\frac{5}{16}''$ stroke, 320.2 cubic inches displacement with a compression ratio of 5.75 instead of 5.45 to 1.

Buicks have a new Aerobat, double float, single bowl, down draft carburetor which it is said will assure positive fuel feed independent of acceleration, steep grades or fast turns. The automatic choke has been re-designed to provide automatic deflooding. All models have automatic idle control. Series 40 and 60 models have a new frame using diagonal cross members. An improved heavy duty generator is a feature. Running boards are designed as radio antenna.

Exterior changes give a racy, bullet-like effect. The radiator grille is die-cast in two pieces with horizontal bars rising to the hood line. The hood top line and color are carried down through the middle of the grille. Bullet-shaped headlamps are molded directly into the radiator shell. Automatic windshield defrosters are available. Over-all height has been dropped one inch and the floors lowered two and a half inches to provide greater head room. Both seats are wider.

New Hudson and Terraplane models are lower, longer and roomier than in the past. A new selective automatic shift transmission for use with the Electric Hand, continued as an optional extra as at present, is offered. Another optional feature is a hydraulic hill-hold device which prevents backing of the car when stopping on a hill. This device is operated by the same fluid used to apply the hydraulic brakes. The clutch pedal is interconnected with a valve through which the brake fluid passes in the application of the hydraulic brakes. This valve prevents the return of the brake fluid until the clutch is depressed, thus keeping the brakes applied until the gear change has been made and the operator is ready to drive the car forward up the hill.

An innovation in both cars is the mounting of the battery under the left front fender where it can be reached by raising the hood. A ventilating arrangement keeps the battery from being affected by engine heat. A slight change has been made in the Electric Hand, now two years old. For 1937, the reverse gate, instead of being just ahead of the low speed slot, is to the side. Previously it has been necessary to lift the shifter trigger when going into reverse.

With the new device in use with the hand controls, the cars can be driven without the use of the left foot.

Though displacement, bore and stroke remain the same, improved carburetion and manifolding have increased the horsepower from 88 to 96 on the DeLuxe model and 101 on the Super-Terraplane. Horsepower of the six-cylinder Hudson engine has been increased from 93 to 101 horsepower and that of the eight-cylinder engine from 113 to 122 horsepower. The makers claim a 10 per cent improvement in gasoline economy.

Graham offers three lines, two of them with supercharged engines, for 1937. Interior treatment follows a design created by Norman Bel Geddes. A center panel section of the steel roof is insulated to serve as a radio aerial. Provision is made for a windshield defroster.

An improved drive has been developed for the supercharger. The rotor now is driven from the crankshaft at 5.75 times engine speed by twin "V" belts. Turning at approximately 23,000 revolutions per minute when the engine is turning 4,000, the supercharger takes the carburetor mixture, scrubs it to a fine mist, brings it to engine temperature and packs it evenly into all cylinders at five pounds above atmospheric pressure.

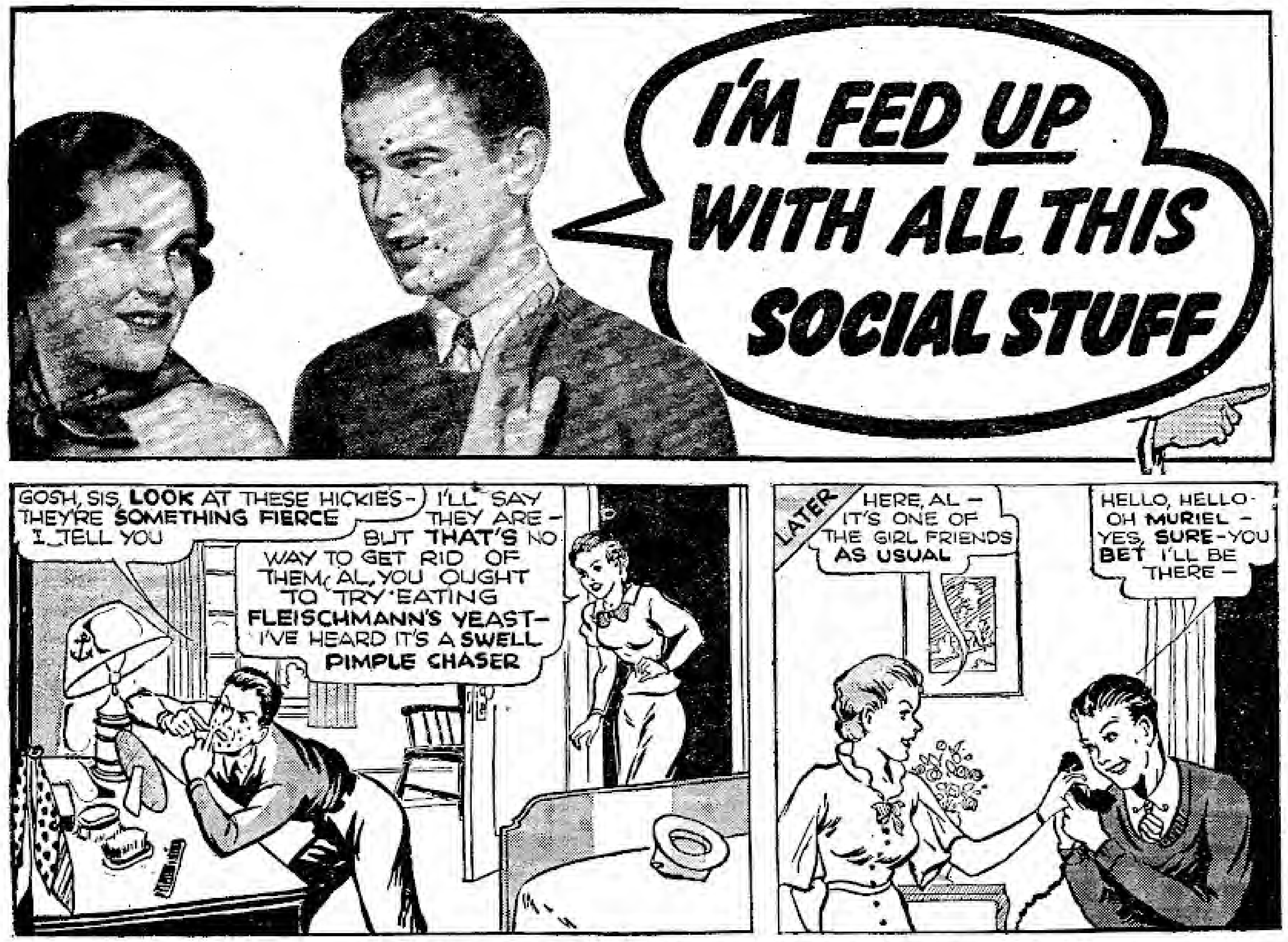
De Sotos have a new high compression engine which is said to develop 93 horsepower with unusual economy in fuel consumption. It has full length water jackets, aluminum alloy pistons, floating power, new U-shaped piston slots and automatic choke. The car has an overall length of 199 inches. The hood, stamped out of one piece, is hinged at the rear and opens from the front.

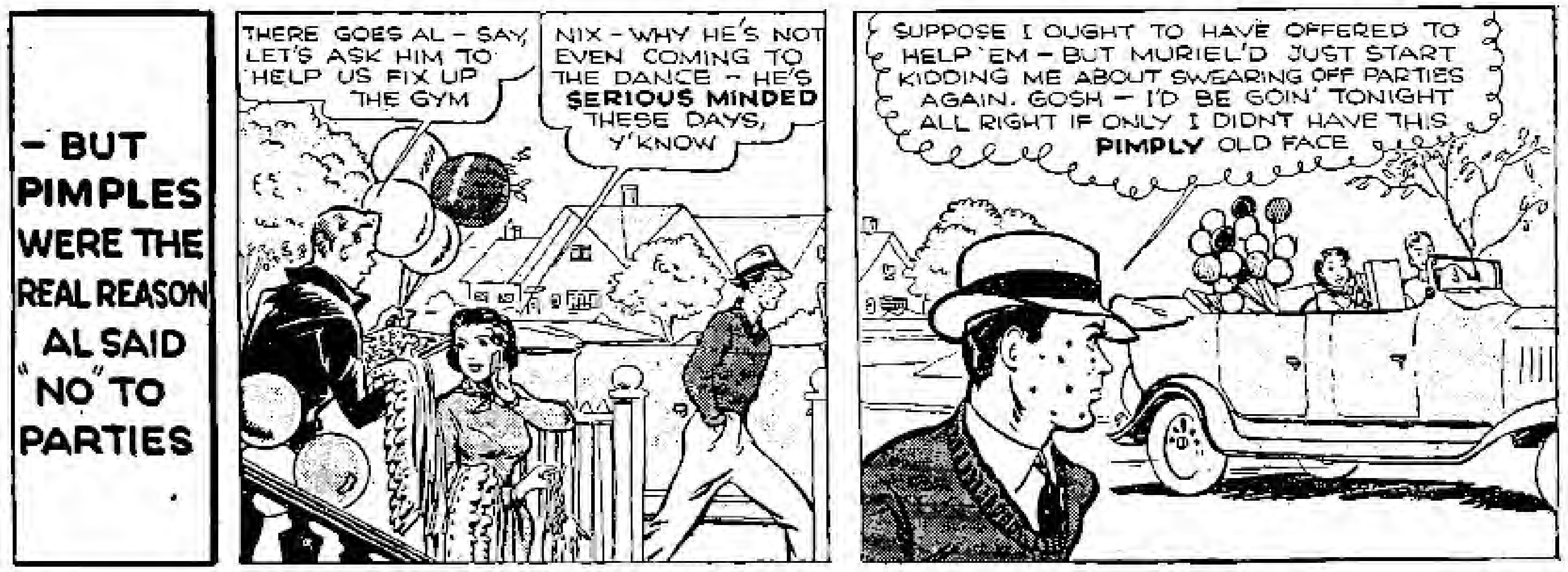
The new design eliminates the cat-walk between the fenders and the hood. Headlights are larger. Defroster vents are built into the top of the instrument panel at either end. Rubber-float body mountings at 14 points insulate the body from road noise.

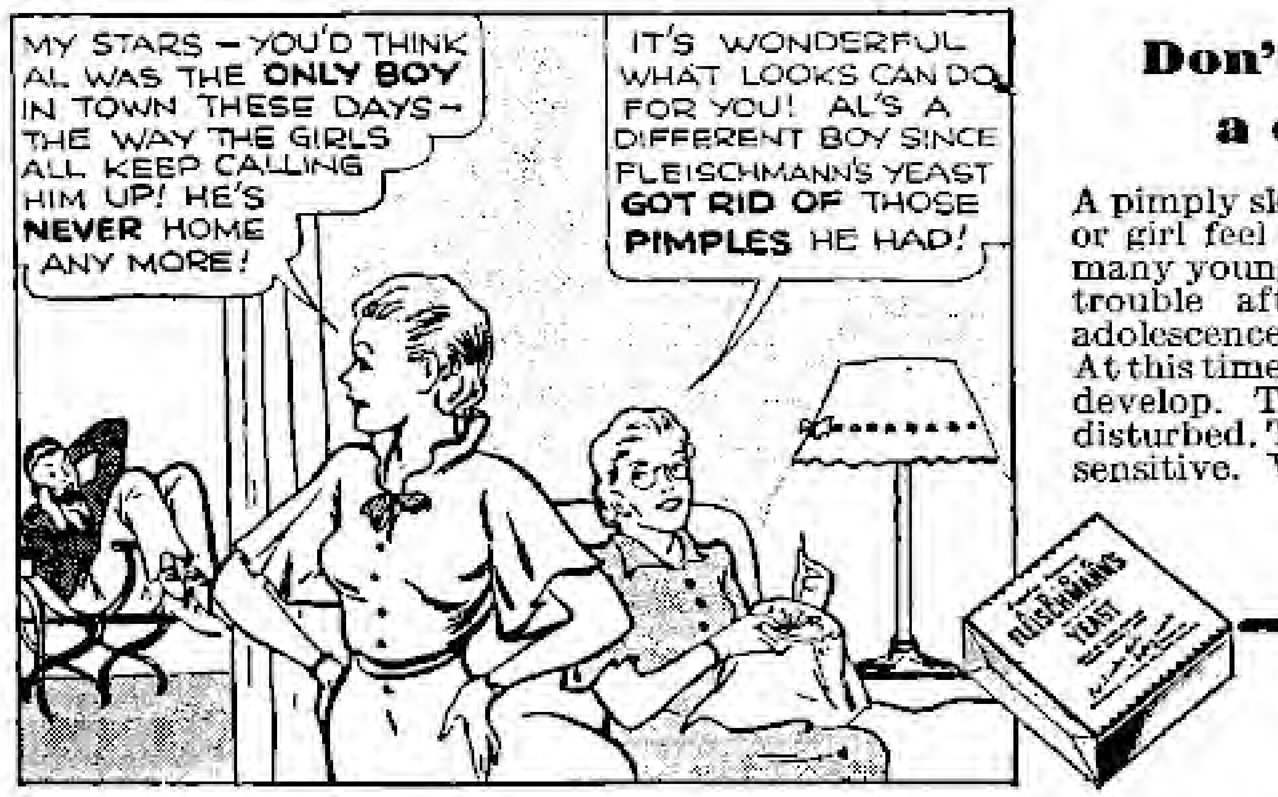
Chassis improvements mark the new Studebaker Dictator and President lines. The President has a new overdrive transmission which is automatically selective. It may be cut in or out at any speed above 35 miles per hour. To cut in the overdrive, the foot is lifted from the accelerator and applied gradually. To cut it out, the foot is applied quickly. Both models have an improved gear shift, hypoid rear axle gears, double drop frame, improved automatic choke and Fram oil and motor cleaners. It is claimed that the last feature will reduce the necessity of changing oil to the seasons if the Fram cartridge is changed when the oil becomes dirty.

The parking brake lever has been removed from the floor, placed at the driver's left and suspended beneath the cowl. The 18-gallon gasoline tanks have been flattened out to give space to tools beneath a larger luggage compartment at the rear. There is a new twin lever steering gear.

In addition to New York, November automobile shows include: Nov. 9-14, Des Moines, Ia.; 11-15, Omaha, Nebr.; 12-19, Philadelphia; 13-19, Toledo; 14-20, Columbus; 14-21, Boston, Chicago, Detroit, Indianapolis, San Francisco, Seattle and Washington, D. C.; 14-22, Los Angeles; 15-22, St. Louis; 15-21, Cincinnati; and at later dates in Des Moines, Ia.; Ottawa, Can.; Pittsburgh, Pa.; Asbury Park, N. J.; Lansing, Mich.; Cleveland, Brooklyn, Buffalo, Minneapolis, Newark, Kansas City, Milwaukee, Portland, Ore.; Hartford and Rochester.


I'M FED UP WITH ALL THIS SOCIAL STUFF
GOSH, SIS, LOOK AT THESE HICKIES - THEY'RE SOMETHING FIERCE I TELL YOU
I'LL SAY THEY ARE - BUT THAT'S NO WAY TO GET RID OF THEM, AL, YOU OUGHT TO TRY EATING FLEISCHMANN'S YEAST - I'VE HEARD IT'S A SWELL PIMPLE CHASER
LATER
HERE, AL - IT'S ONE OF THE GIRL FRIENDS AS USUAL
HELLO, HELLO - OH MURIEL - YES, SURE - YOU BET I'LL BE THERE -


- BUT PIMPLES WERE THE REAL REASON AL SAID "NO" TO PARTIES
THERE GOES AL - SAY, LET'S ASK HIM TO HELP US FIX UP THE GYM
NIX - WHY HE'S NOT EVEN COMING TO THE DANCE - HE'S SERIOUS MINDED THESE DAYS, Y'KNOW
SUPPOSE I OUGHT TO HAVE OFFERED TO HELP 'EM - BUT MURIEL'D JUST START KIDDING ME ABOUT SWEARING OFF PARTIES AGAIN. GOSH - I'D BE GOIN' TONIGHT ALL RIGHT IF ONLY I DIDN'T HAVE THIS PIMPLY OLD FACE


MY STARS - YOU'D THINK AL WAS THE ONLY BOY IN TOWN THESE DAYS - THE WAY THE GIRLS ALL KEEP CALLING HIM UP! HE'S NEVER HOME ANY MORE!
IT'S WONDERFUL WHAT LOOKS CAN DO FOR YOU! AL'S A DIFFERENT BOY SINCE FLEISCHMANN'S YEAST GOT RID OF THOSE PIMPLES HE HAD!
FLEISCHMANN'S YEAST

Don't let Adolescent Pimples put a check on your good times

A pimply skin makes *any* boy or girl feel low spirited. Yet many young people have this trouble after the start of adolescence—from 13 to 25. At this time important glands develop. The whole body is disturbed. The skin gets over-sensitive. Waste poisons in the blood irritate this sensitive skin—pimples break out.

Fleischmann's fresh Yeast clears these skin irritants out of the blood. Then, pimples go. Eat 3 cakes daily, one before each meal—plain, or in a little water—until your skin is perfectly clear.

—clears the skin

by clearing skin irritants out of the blood

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